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ABSTRACT

This synthesis of the research literature on early intervention for young children with disabilities focuses on factors that contribute to quality, and then reviews what is known about two types of tools for young children with disabilities: toys and technology. It begins by examining current perspectives on quality education for all children, which is then extended to quality perspectives unique to children with disabilities. It addresses the current debate regarding the relevance of "developmentally appropriate practice," summarizes what is known about effective early intervention practices, and argues that the legitimacy of early intervention is well-established both legally and in the research and practice arena. The next chapter reviews the literature on toy play in infancy and early childhood. It outlines a set of guidelines for parents and professionals to select the most appropriate toys for young children, including suggestions for adapting toy play for young children with special needs. The third chapter (Patsy L. Pierce) looks at technology integration into early childhood curricula. It discusses three major types of technology--television, videos/interactive videodisc, and computers and software--in terms of how the technology is used, its impact on developmental domains, and suggestions for improved development and use with very young children. Assistive technology options are also described. (Each chapter contains extensive references.) (DB)

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Research Synthesis on Early Intervention Practices

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Research Synthesis on Early Intervention Practices

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Research Synthesis: Early Intervention Practices

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Chapter 1

Defining Quality in Early Intervention

Rationale for Early Intervention

Early intervention may defined as the provision of educational, therapeutic, preventive, and family support services to young children with disabilities and their families. The underlying premise of early intervention is that by providing these services as early as possible, we maximize the likelihood of later success for children and support families during a critical time in family growth and adaptation.

Support for early intervention comes from four primary sources. *First*, a series of federal laws and initiatives has established a legal basis for and a right to early intervention services for children with disabilities and their families. Federal statutes (Public Laws 99-457 and 102-119) mandate services for preschool children (ages 3-5 years) and provide incentives and guidelines for serving infants and toddlers (birth to 36 months). Currently all states have passed legislation conforming with federal requirements for preschoolers and all are participating in some way in the Part H program for infants and toddlers. The Americans with Disabilities Act requires that public facilities, including public day care centers, be physically accessible to all children and that children with disabilities cannot be denied enrollment in those programs simply because the child has a disability. Also, Head Start legislation requires that at least 10% of the children enrolled in Head Start programs must be children with some type of disability.

Second, research from a variety of fields suggests that the early years are especially formative in social, cognitive, language, and motor development. Although the brain is now appearing to be more resilient than earlier thought (Huff, Bijur, Markowitz, Ma, & Rosen, 1993), it is clear that experiences during the early years serve as a critical basis for later growth and development. This statement holds true for both positive and negative experiences. For example, low-level lead exposure is likely to have a more deleterious

effect on the cognitive development of young children than equivalent amounts of exposure would have on adults (Goyer, 1993; Needleman & Gatsonis, 1990; White, Diamond, Proctor, Morey, & Hu, 1993).

Third, numerous studies have provided substantial evidence that early intervention is indeed effective in facilitating development during the early years and promoting later life success. The evidence is especially strong in the case of children from low-income families. A host of studies in the 1970's and 1980's clearly showed that early intervention for children living in poverty could dramatically affect scores on standardized tests of language and cognitive development (Smith & Bissell, 1970; Haskins, 1989). Subsequent follow-up studies have provided strong evidence that high quality programs have significant and lasting effects on school achievement, school retention, and the need for special education services (Campbell & Ramey, 1994; Caughy, DiPietro, & Strobino, 1994; Lazar, Darlington, Murray, Royce, & Snipper, 1982), and one adult follow-up has suggested that early intervention effects extend beyond the school years, influencing pregnancy, marital status, employment, and arrests (Berrueta-Clement, Schweinhart, Barnett, Epstein, & Weikart, 1985). Evidence also exists in support of early intervention for children who are at risk due to low birthweight or prematurity (Bennett, 1987; Resnick, Eyler, Nelson, Eitzman, & Bucciarelli, 1987). For example, the largest and most comprehensive of these studies showed that low-birthweight children participating in a three-year intervention program scored 10 points higher on standardized tests of intelligence than similar children who did not participate in the program (Infant Health and Development Program, 1990).

Many papers over the past decade have reviewed research on the effects of early intervention on children with disabilities. In general, these reviews suggest that early intervention results in modest but significant effects on children's development (Casto & Mastropieri, 1986; Dunst & Rheingrover, 1981; Ottenbacher, 1989; Shonkoff & Hauser-Cram, 1987; Simeonsson, Cooper, & Scheiner, 1982). For example, in a meta-analysis of

74 early intervention studies, Casto and Mastropieri (1986) reported an overall effect size for early intervention of .68; this effect size dropped to .40 when only high-quality studies were included in the analysis.

Finally, evidence from a variety of sources suggests that early intervention can play a substantial role in supporting families (Heinick, Beckwith, & Thompson, 1988; Kraus, Upshur, Shonkoff, & Hauser-Cram, 1993; Parker, Piotrkowski, & Peay, 1987; Tannock, Girolametto, & Siegel, 1992). It has been demonstrated through both research and ample case study evidence that families of children with disabilities face significant challenges in raising a child with a disability and must make many accommodations in a wide range of family routines and activities as they seek to adjust to the presence of a family member with a disability (Bailey, Blasco, & Simeonsson, 1992; Brinker, Seifer, & Sameroff, 1994; Nihira, Weisner, & Bernheimer, 1994). Family support is likely to be especially critical during the early years as families first learn about their child's disability, experience the initial challenges associated with the search for appropriate services, and readjust life expectations on the basis of an uncertain future. Family research suggests that support is an important part of dealing with disability and that early intervention programs can play an important role in the context of family support (Dunst, Trivette, & Deal, 1988).

Thus it is clear that early intervention is well established today as a critical component of the education and care of children with disabilities. Although questions regarding the effectiveness of early intervention still arise, most researchers have now directed their efforts to developing an understanding of factors that contribute to *quality* in early intervention programs. This paper reviews the literature on the question of determining quality in early intervention. In order to address this issue in a meaningful fashion, we first begin with a brief overview of the goals of early intervention and basic characteristics of the population of children likely to participate in early intervention programs. Drawing on these data, we then focus our discussion on quality. Our review of

quality begins with current perspectives on quality for all children, regardless of whether they have a disability, and then is extended to perspectives on quality that are unique to children with disabilities. In this review we recognize that quality has both objective and subjective components, and that information about quality derives in part from research and in part from the establishment of professional standards based on both research and clinical practice. Much of our review in this section focuses on the current debate regarding the relevance of "developmentally appropriate practice", as defined by the National Association for the Education of Young Children, for young children with special needs and their families. Finally, we review what is known about two types of tools for young children with disabilities: toys and technology.

Goals for Early Intervention

What are we trying to accomplish through the provision of early intervention for young children with disabilities? In answering this question, we should first ask what are the goals for all children during this important period of development. The National Association for the Education of Young Children (1990) suggests 15 broad goals for young children. These include the development of a positive self-concept; self-control; curiosity about the world; confidence and identify of self as a learner; relationships with others; effective communication and literacy skills; representational and pretend play skills; critical thinking; knowledge acquisition and understanding of relationships; appreciation of the arts; self-help skills; and knowledge of basic health practices. These also represent goals of importance for young children with disabilities.

In addition to these important domains, Bailey and Wolery (1992) suggest that early intervention is designed to accomplish a number of other goals. *First*, early intervention should support families in achieving their own goals and in securing the support they need for the successful adaptation to a child with a disability. Family support is critical during this period of time as parents have only recently learned about their child's disability and are experiencing their first interactions with agencies and special

professionals. *Second*, early intervention ought to help children become actively engaged in their environments, be independent, and exhibit a desire to master their environments. Because many children with disabilities are less likely to exhibit mastery behavior than typically developing children (Ruskin, Mundy, Kasari, & Sigman, 1994), early intervention needs to focus specifically on helping children develop the skills and motivation needed to adapt to changing environments by exploring those environments and testing strategies for successful participation. *Third*, early intervention should promote children's development in key areas, including cognition, communication, self-help, social-emotional, fine motor, and gross motor skills. Of critical importance for children with disabilities is the need to use instructional strategies that facilitate the generalized use of acquired skills in diverse environments. In fact, Bricker and Cripe (1992) argue that the basic goal of early intervention ought to be: "to improve children's acquisition and use of important motor, social, affective, communication, and intellectual...behaviors that, in turn, are integrated into response repertoires that are generative, functional, and adaptable" (pp. 10-11). *Fourth*, recognizing the pervasive social skills deficits exhibited by many children with disabilities, early intervention should build and support social competence, including peer social interaction skills (Odom, McConnell, & McEvoy, 1992) and the development of friendships (Guralnick & Groom, 1988). *Fifth*, early intervention should provide and help prepare children for normal life experiences. To the greatest extent possible this means that early intervention should be provided in typical environments with typical children (Buysse & Bailey, 1993). Because of the unique challenges associated with major life transitions, early intervention programs also should help prepare both children and families for the transition process (e.g., transition from preschool to kindergarten) and teach skills most likely to facilitate successful placement in future settings (Polloway, 1987). *Finally*, early intervention ought to prevent the emergence of future problems or disabilities. This goal is important both in terms of primary prevention of disabling conditions (e.g., through parent education and support programs, genetic counseling, community awareness, etc.),

as well as in terms of preventing secondary and tertiary effects for persons experiencing a primary disability (Simeonsson, 1991).

Characteristics of Young Children with Disabilities

Unlike most special education endeavors, in which intervention is framed around particular types of disabilities (e.g., learning disabilities, emotional and behavioral disorders, autism, mental retardation, motor impairments), early intervention is defined first and foremost by the ages of the children served. This perspective reflects a fundamental assumption that there are unique features of development during the first six years of life that serve as a basis for determining the nature of services to be provided. What are the characteristics of young children with disabilities that shape and define early intervention practices? The answer to this question begins with a discussion of characteristics of young children and extends to special considerations for young children with disabilities.

First, it must be recognized that while all individuals continue to grow and learn, the early childhood years probably reflect the period of most rapid growth, both in a physical sense as well as in a broader developmental sense. In the brief space of six years, the typical child moves from a newborn to an individual who can walk, has a full repertoire of language, has mastered most basic self-help skills, and has the capacity for developing extended and significant relationships with peers and adults. Brain growth during this period is substantial and neural pathways are established that form the basis for lifelong learning. The implication of this characteristic is the need for early childhood teachers and early intervention professionals to have considerable knowledge about the nature of development during this period and to be able to frequently assess the developmental status of each individual child so that interventions are individualized and developmentally appropriate (Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993).

A second important consideration during the early childhood period is an understanding of the ways in which the young child learns. Although many theories have

been developed for describing and explaining development and learning (Piaget, 1952; Vygotsky, 1978), most researchers and practitioners today agree that the typical young child is engaged in her or his environment as an active learner. Learning is often self-initiated and determined by curiosity about the environment and an apparent drive towards mastery or self-competence (White, 1959). Attention to an activity usually results from an interest in the activity or object rather than from adult directives. Interactions with objects or people are often brief, but may be repeated over and over again (e.g., a child who takes apart and puts together the same puzzle several times each day). Learning occurs as a direct result of observing and experiencing the effects of one's one behavior with concrete materials and people. The implication of this set of characteristics is that early childhood teachers and early intervention professionals must design and provide environments that are interesting, developmentally appropriate, full of concrete, manipulable materials, and responsive.

A third characteristic of critical importance in the early childhood years is that learning often occurs in the context of social relationships and social interactions with both peers and adults. Relationships help provide a secure base for children from which they can explore and learn, and interactions with others provide both the opportunity for observational learning as well as for feedback from others.

Bredekamp and Rosegrant (1992) and the National Association for the Education of Young Children summarize current thinking about how young children develop and learn in the form of six statements:

* Children learn best when their physical needs are met and they feel psychologically safe and secure;
* Children construct knowledge;
* Children learn through social interaction with adults and other children;
* Children's learning reflects a recurring cycle that begins in awareness and moves to exploration, to inquiry, and finally, to utilization;

* Children learn through play;
* Children's interests and "need to know" motivate learning;
* Human development and learning are characterized by individual variation (pp. 14-17).

A distinguishing feature of early intervention programs for children with disabilities is that very few are categorical in nature. In fact, most states and local communities depart from the usual system of classifications required for school age children. Infants and young children with disabilities are typically labeled as either being developmentally delayed (e.g., scoring below a certain range on a standardized measure of development), having an established condition likely to lead to a delay or disability (e.g., Down syndrome, myelomeningocele, fragile X syndrome), or at risk for developmental delay or disability due to factors such as low birthweight or poverty. Early intervention professionals often work with the full range of disabilities and thus the usefulness of general comments describing the characteristics of young children with disabilities is relatively low.

Children with disabilities should be viewed first within the developmental period in which they are experiencing, rather than in the context of their disability. A developmental perspective provides essential information about learning styles and the appropriateness of materials needed for maximizing children's development. For example, a well-accepted (although inadequately documented) assumption in early childhood is that the provision of toys that are moderately challenging for children are best for enhancing development and learning (Yoder, 1990). For children with disabilities, however, it must be recognized that many will be experiencing a developmental delay. Thus chronological age may not be the best predictor of developmental status and the selection of optimal toys and materials will depend on accurate developmental assessments and observations by knowledgeable adults. Also, although it has been demonstrated that mastery motivation is a viable construct for young children with disabilities (Hupp & Abbeduto, 1991), research suggests that children

with mental retardation often exhibit less task orientation and lower levels of mastery motivation than normally developing children and may not respond as effectively to pleasure or self-reward as a function of task accomplishment (Ruskin et al, 1994). Thus teachers may need to play a more active role in facilitating interactions with the environment and in providing feedback. Also, it has consistently been demonstrated that young children with disabilities usually engage in lower levels of social play and social mastery than do typically developing peers (MacTurk, Hunter, McCarthy, Vietze, & McQuiston, 1985). Thus teachers must play an active role in encouraging and supporting social interactions.

Recommended Practices for Working with Young Children

The early childhood period is now viewed as a critical time in the development of young children. What practices are recommended in caring for and teaching typically developing young children?

The most visible statement of recommended practices comes from the National Association for the Education of Young Children (Bredekamp, 1987). These guidelines, referred to as *developmentally appropriate practice* (DAP), have been widely distributed in the past seven years and have become the focus of an extensive and continuing series of discussions regarding the meaning of DAP and its relevance to young children with disabilities. In this section, we discuss the fundamental tenets of DAP as it pertains to typically developing children and the discussion that has occurred in that context.

Basic dimensions of developmentally appropriate practice. DAP emerged out of a concern that early childhood programs were becoming too academically focused in content and too formal in instructional style (Bredekamp, 1986). Drawing on a diverse array of theoretical perspectives and knowledge about development, NAEYC argued that developmental appropriateness had two dimensions: age appropriateness and individual appropriateness. In other words, a curriculum approach for young children must take into consideration both the unique features of the early childhood years as well as the unique

features of each individual child. The official position statement of NAEYC provides 20 specific guidelines for developmentally appropriate practice:

1. The curriculum has an articulated description of its theoretical base that is consistent with prevailing professional opinion and research on how children learn;

2. Curriculum content is designed to achieve long-range goals for children in all domains -- social, emotional, cognitive, and physical -- and to prepare children to function as fully contributing members of a democratic society;

3. Curriculum addresses the development of knowledge and understanding, processes and skills, dispositions and attitudes;

4. Curriculum addresses a broad range of content that is relevant, engaging, and meaningful to children;

5. Curriculum goals are realistic and attainable for most children in the designated age rang for which whey were designed;

6. Curriculum content reflects and is generated by the needs and interests of individual children within the group;

7. Curriculum respects and supports individual, cultural, and linguistic diversity. Curriculum supports and encourages positive relationships with children's families;

8. Curriculum builds upon what children already know and are able to do to consolidate their learning and to foster their acquisition of new concepts and skills;

9. The curriculum provides conceptual frameworks for children so that their mental constructions based on prior knowledge and experience become more complex over time;

10. Curriculum allows for focus on a particular topic or content, while allowing for integration across traditional subject-matter divisions by planning around themes and/or learning experiences that provide opportunities for rich conceptual development;

11. The curriculum content has intellectual integrity; content meets the recognized standards of the relevant subject-matter disciplines;

12. The content of the curriculum is worth knowing; curriculum respects children's intelligence and does not waste their time;

13. Curriculum engages children actively, not passively, in the learning process. Children have opportunities to make meaningful choices;

14. Curriculum values children's constructive errors and does not prematurely limit exploration and experimentation for the sake of ensuring "right" answers;

15. Curriculum emphasizes the development of children's thinking, reasoning, decision-making, and problem-solving abilities;

16. Curriculum emphasizes the value of social interaction to learning in all domains and provides opportunities to learn from peers;

17. Curriculum is supportive of children's physiological needs for activity, sensory stimulation, fresh air, rest, hygiene, and nourishment/elimination;

18. Curriculum protects children's psychological safety, that is, children feel happy, relaxed, and comfortable rather than disengaged, frightened, worried, or stressed;

19. The curriculum strengthens children's sense of competence and enjoyment of learning by providing experiences for children to succeed from their point of view;

20. The curriculum is flexible so teachers can adapt to individual children or groups (NAEYC, 1991, pp. 29-31).

A review of these guidelines reflects several themes. First, of course, is that curriculum activities should be individually determined on the basis of children's needs, interests, and abilities. Second, the guidelines emphasize a play-oriented approach to a curriculum that draws on children's expressed interests for learning activities. Children are assumed to be self-motivated learners and are encouraged to explore their environments and play. Teachers are discouraged from attempting to structure activities too much or from focusing on "academic" content, and artificial motivation strategies, such as external rewards, are generally viewed as inappropriate.

Quality and its relationship to developmentally appropriate practice. A great deal of research has been published in the last decade relating to appropriate early childhood practices. It should first be noted that virtually none of this research has been directed toward an explicit evaluation of "developmentally appropriate practice" (DAP). In part this is due to the fact that DAP is a broad-based construct that includes many components that could be interpreted in a variety of ways. Thus a direct test of the relative effectiveness of DAP would be virtually impossible. However, the literature contains numerous curriculum evaluation studies and, perhaps more relevant, a broad series of studies purporting to investigate "quality" and its effects on the behavior and development of young children.

Any understanding and interpretation of the research on quality must recognize two critical features of quality. First, quality has both objective and subjective components. For example, a general principle of quality may be agreed upon by almost everyone (e.g., it is better to have more rather than fewer adults available in the classroom), but the minimal and optimal standards (e.g., exactly what adult-child ratio is needed) may be subject to extensive disagreement. Some dimensions of quality are easily measured with high reliability (e.g., adult-child ratio, number of square feet per child),

some aspects are more global (e.g., developmentally appropriate practice), and some are based on individual beliefs about what is right for children (e.g., a warm climate that builds self-esteem). Second, quality has both standard and individual components. Some aspects of quality are recognized as appropriate for all children (e.g., a responsive caregiver), but these standards may need to be modified or new standards added based on the needs of individual children. Ultimately it may not be the objective dimensions of quality that are so important as the "goodness of fit" or match between the child's needs and characteristics of the program (Thomas & Chess, 1977). Under this model, optimal outcomes occur when there is a consonance or goodness of fit between child and family characteristics and critical features of the environment. Poor outcomes are likely when there is a mismatch or discrepancy between what is needed or wanted and what is provided.

Quality has been described in many ways in the early childhood literature. One way is to cluster significant dimensions of quality. For example, Dunn (1993) defined *distal* quality as aspects of a program potentially available for children (adult-child ratio, group size, caregiver characteristics, etc.), whereas *proximal* quality reflects those dimensions of a program actually experienced by children (interactions with caregivers and peers, curriculum procedures, etc.). Phillips and Howes (1987) differentiate four types of quality: *contextual* (e.g., the community and state ecology in which a program operates), *global* (e.g., broad-based measures of overall program quality), *structural* (e.g., staff-child ratio, space available, age mixture of the children), and *dynamic* or *process* (e.g., adult-child interactions, peer-peer interactions).

In practice, quality is often operationalized through the development and application of assessment instruments. In the early childhood literature, three primary measures have emerged as ways to evaluate program quality and developmentally appropriate practice. Perhaps the most well-known and widely used of these is the Early Childhood Environment Rating Scale (ECERS; Clifford & Harms, 1980) and subsequent

variations of the measure designed for infant/toddler programs (Harms, Cryer, & Clifford, 1990) and for family day homes (Harms & Clifford, 1989). The ECERS contains 35 items assessing seven dimensions of program quality: personal care routines, furnishings and display, language-reasoning experiences, fine and gross motor activities, creative activities, social development, and adult needs. The Early Childhood Classroom Observation Scale (ECCOS; Bredekamp, 1986) was developed by NAEYC to aid in the accreditation system based on NAEYC's Criteria for High Quality Early Childhood Programs (NAEYC, 1984). The scale consists of 75 items (e.g., staff talk with and listen to individual children during activities and routines such as arriving and departing). A study by Bredekamp (1986) found that a factor analysis yielded three primary dimensions of quality: preschool curricula, positive interactions among staff and children, and a balanced schedule of activities. Finally, Hyson, Hirsh-Pasek, and Rescorla (1990) developed the Classroom Practices Inventory, an observation instrument based conceptually on NAEYC's guidelines for DAP. The inventory consists of 26 items found to cluster in four factors: (a) "encouragement of curiosity and creativity through provision of concrete, open-ended materials and divergent teacher questions" (p.482); (b) practices related to workbooks, rote learning, and drill; (c) positive emotional climate and positive discipline; and (d) physical activity and individualized learning. While each of these measures has a unique organization, content, and scoring system, all three emphasize similar dimensions of quality, all of which are generally consistent with the DAP framework.

The Preschool Assessment of the Classroom Environment-Revised (Project SUNRISE, 1989) is an extension of the concepts underlying the above measures, but is specifically designed for programs serving children with disabilities. The PACER is divided into seven sections: program foundation and philosophy, management and training, environmental organization, staffing patterns, instructional context, instructional techniques, and program evaluation. As is evident from the items on this measure, its focus on instructional techniques reflects some of the differences between programs for

typically developing children and those for children with disabilities, a topic we address in greater detail in subsequent sections of this chapter.

Research on program quality. At least three approaches to studying quality are possible. Haskins (1989) took one approach by reviewing much of the literature on the effectiveness of early intervention for children from low-income families. He divided the studies into those that were conducted in well-run model preschools (usually university-based) and those conducted in more typical Head Start settings. He concluded that both model and typical programs significantly influenced intellectual and social development during the period of time that the program was in operation. In terms of long-term follow-up of the effects of intervention, both high quality and typical programs generally showed a decline in the benefits of early intervention as evidenced by standardized test performance. In the case of school retention and special education placement, there is strong evidence that model programs had a positive effect, but only modest evidence of such effects for typical programs. Furthermore, "on measures of life success such as teen pregnancy, delinquency, welfare participation, and employment, there is modest evidence of positive impacts for model programs but virtually no evidence for Head Start" (Haskins, 1989, p. 278). Thus this review supports the generally held assumption that higher quality programs are more effective than lower quality programs. These studies were not a direct test of the effects of DAP, however, and some of the model programs studied used more academically focused approaches.

A second approach is to review studies of the effects of specific dimensions of quality. Numerous studies have looked at a wide range of specific program dimensions and their effects on children. Adult-child ratio and group size have consistently been shown to be important indicators of program quality (e.g., Holloway & Reichart-Erickson, 1988; Howe, Phillips, & Whitebook, 1992), and national standards for such ratios have been established (National Academy of Early Childhood Programs, 1984). The National Child Care Staffing Study (Whitebook, Howes, & Phillips, 1990) found that staff

qualifications and training were important predictors of quality in child care programs. Our own research has shown that mixed-age programs can have substantial benefits over same age groupings for younger children and for children with disabilities (Bailey, Burchinal, & McWilliam, 1993; Blasco, Bailey, & Burchinal, 1993; Burchinal, Bailey, & Snyder, in press; Roberts, Burchinal, & Bailey, in press). Other studies have examined various aspects of specific dimensions of a preschool program. For example, Howe, Moller, Chambers, and Petrakos (1993) studied the ecology of dramatic play centers and its effects on children's play. Higher levels of dramatic play were associated with familiar centers with frequency of center use; gender and age differences in the use of centers was also found. This literature is too broad to review for this text; suffice it to say that numerous studies have examined selected aspects of quality. However, as we shall report later, this research is limited and must be expanded to enhance our knowledge base for services.

A third approach is to assess various dimensions of quality in an early childhood program and determine the relationships between quality and outcomes for children. In preparing this paper, we reviewed the early childhood literature that related to program quality. We found 13 studies that examined multiple dimensions of quality and how it related to some aspect of children's behavior and development. These studies are presented in the order in which they were published and summarized in Table 1.

AUTHORS	TITLE	FINDINGS

Anderson, Nagle, Roberts, & Smith (1981)	Attachment to Substitute Caregivers as a Function of Center Quality and Caregiver Involvement	Observed 35 preschoolers in strange situation and looked at results as a function of caregiver involvement (mean % of time interacting with children) and physical environment (unpublished rating scale, Peterson). More secure attachments were observed in children where caregivers working in a high-quality center were highly involved with the children on an ongoing basis.
McCartney, Scarr, Phillips, Grajek, & Schwarz (1982)	Environmental Differences Among Day Care Centers and Their Effects on Children's Development	Observed 130 children in Bermuda, tested them on a number of dimensions, and related findings to quality of child care (ECERS). Children at the better quality centers scored higher on measures of language development, intelligence, and task orientation. Nearly half of the variance in ratings of sociability was accounted for by the total quality scores of the centers, and children in high-quality centers were rated as more considerate of others.
Vandell & Powers (1983)	Day Care Quality and Children's Free Play Activities	Children in high quality centers were more likely to interact positively with adults, while children in low-quality centers were more likely to engage in solitary play and aimless wandering.
McCartney (1984)	Effect of quality of Day Care Environment on Children's Language Development	Using the Bermuda data set, found that overall quality (ECERS) was predictive of all four measures of intellectual and language development, controlling for family background and current center care experience.

McCartney, Scarr, Phillips, & Grajek (1985)	Day Care as Intervention: Comparisons of Varying Quality Programs	Disadvantaged children attending high-quality government day care intervention programs had better language skills and were rated as more considerate and more sociable than children attending other day care programs of lower, but varying quality.
Bjorkman, Poteat, & Snow (1986)	Environmental Ratings and Children's Social Behavior: Implications for the Assessment of Day Care Quality	Observed 2 high-quality (ECERS) and 2 low-quality programs, rating 10 children in each. No clear-cut associations were found between day care quality and social behavior.
Holloway & Reichart-Erickson (1988)	The Relationship of Day Care Quality to Children's Free-Play Behavior and Social Problem-Solving Skills	Relationships were found between dimensions of quality and children's absorption in solitary play and knowledge of social problem solving.
Vandell, Henderson, & Wilson (1988)	A Longitudinal Study of Children with Day-Care Experiences of Varying Quality	Observed 20 children at age 4 and again at age 8. At 8 years of age, children who had been in high quality centers had more friendly interactions and fewer unfriendly interactions with peers, were rated as more socially competent and happier, and received fewer "shy" nominations from peers.
Burts, Hart, Charlesworth & Kirk (1990)	A Comparison of Frequencies of Stress Behaviors Observed in Kindergarten Children in Classrooms with Developmentally Appropriate versus Developmentally Inappropriate Practices	Observed 37 children in DA (20) and DI (17) classrooms. Children in DI classrooms exhibited significantly more stress behaviors.
Howes, Phillips, & Whitebook (1992)	Thresholds of Quality: Implications for the Social Development of Children in Center-Based Child Care	Children cared for in classrooms meeting FIDCR ratios were more likely to be rated higher in quality. Children in quality classrooms were more likely to be rated as securely attached and also more competent with peers.

Frede & Barnett (1992)	Developmentally Appropriate Public School Preschool: A Study of Implementation of the High/Scope Curriculum and Its Effects on Disadvantaged Children's Skills at First Grade	Measured the extent to which program quality (as measured by a composite of items from the High Scope measure, ECERS, and ECCOS) was implemented in preschool programs. Higher implementation was related to better outcomes on a first grade measure of cognitive skills.
Hestenes, Kontos, & Bryan (1993)	Children's Emotional Expression in Child Care Centers Varying in Quality	More positive affect was observed in higher quality settings. Quality was primarily accounted for by the appropriateness of caregiving.
Dunn (1993)	Proximal and Distal Features of Day Care Quality and Children's Development	Distal quality (ECERS) was positively associated with both cognitive and social development. Proximal quality (actual events in the classroom) was positively related to social development.

Of the 13 studies, 12 found positive relationships between measured quality and desired outcomes for children. Among the positive outcomes associated with higher levels of quality include more secure attachments (Anderson, Nagle, Roberts, & Smith, 1981; Howes, Phillips, & Whitebook (1992); higher scores on measures of language development (McCartney, 1984; McCartney, Scarr, Phillips, & Grajek, 1985; McCartney, Scarr, Phillips, Grajek, & Schwarz, 1982); higher scores on measures of cognitive outcomes (Dunn, 1993; Frede & Barnett, 1992; McCartney et al., 1984); higher task orientation (McCartney et al., 1982); more positive social interactions with peers and adults (Dunn, 1993; Holloway & Reichart-Erickson, 1988; Howes, Phillips, & Whitebook, 1992; McCartney et al., 1982; 1985; Vandell, Henderson, & Wilson, 1988; Vandell & Powers, 1983); less aimless wandering (Vandell & Powers, 1983); more positive affect (Hestenes, Kontos, & Bryan, 1993); and less stress (Burts, Hart, Charlesworth, & Kirk, 1990).

It should be noted that these studies are all correlational in nature and none randomly assigned children to different models of treatment. Thus the results of some studies could have been influenced by selection factors. Despite this limitation, however, it is clear from the literature that broadly defined measures of quality generally seem to have a positive relationship with desirable outcomes for children. What is not known are the specific domains of the early preschool environment most likely to contribute to these effects. Additional research is needed that examines specific dimensions of the preschool physical environment (e.g., provision of adequate toys and materials) or the "instructional" environment (e.g., the extent to which the teacher plays an active role in teaching children) in an experimental fashion.

Responses to DAP in the early childhood literature. Although DAP is generally well-accepted in the field of early childhood education (focusing primarily on typically developing children), some questions have been raised about it. In one of the few published articles on this topic, Fowell and Lawton (1992), drawing on the work of Ausubel (Ausubel, Novak, & Hanesian, 1978), argued that a program could (and perhaps should) be more structured, with more teacher direction and some situations in which children are expected to provide the correct answers to specific questions. Furthermore, the authors view some preacademic instruction as also being a legitimate curriculum component and consistent with prevailing theories of child growth and development. Bredekamp (1993), in a response to Fowell and Lawton, briefly argued that the guidelines for DAP were more inclusive than was portrayed by Fowell and Lawton. In a more detailed response to criticisms of DAP, Bredekamp and Rosegrant (1992) made five statements in an attempt to correct what they perceived to be as misinterpretations of DAP:

1. DAP is not a curriculum, nor is it a rigid set of expectations;
2. DAP does not mean that teachers don't teach and that children control the classroom;

3. DAP does not reject goals and objectives; curriculum does not emerge only from children;

4. DAP is for all children;

5. Curriculum is not child development (Bredekamp & Rosegrant, 1992, pp. 4-5).

In discussing these points, the authors argue that DAP is a philosophical framework based on knowledge about development and knowledge about individual differences in children. Teachers must adapt their teaching styles in ways that meet the needs of individual children, while at the same time recognizing and building upon the natural ways young children learn about their environment.

Responses to DAP in the early childhood special education literature. Although some controversy has surrounded DAP in the regular early childhood literature, it is minimal compared with the discussions that have occurred in the early childhood special education literature. Several articles have appeared in the professional literature addressing this issue from a variety of perspectives (Bredekamp, 1993; Carta, Atwater, Schwartz, & McConnell, 1993; Carta, Schwartz, Atwater, & McConnell, 1991; Johnson & Johnson, 1992; 1993; Mallory, 1992; Mallory & New, 1994; Wolery, Strain, & Bailey, 1992). In general, the focus of this debate has been on the extent to which young children with disabilities must be taught in a fashion that is different from that used for normally developing children. Central to the discussion is the extent to which a teacher ought to set specific goals or objectives for children and whether teachers should be more directive in their teaching styles. Although disagreement continues in some areas, most agree with Wolery, Strain, and Bailey's (1992) conclusion that, for many children with disabilities, DAP provides necessary but insufficient conditions for optimal growth and development. In other words, the guidelines and framework for developmentally appropriate practice provide an important basis for understanding the needs and learning styles of young children. All children should be in environments which are normal, developmentally

appropriate, provide opportunities for personal choice, and have functional consequences for behavior. However, all children should also be in environments which are *effective* (help children grow and development), *efficient* (make the best use of child and adult time, and *functional* (promote the generalized use of skills in appropriate contexts) (Bailey & McWilliam, 1990).

In discussing the relevance of DAP to young children with disabilities, Wolery, Bailey, and Strain (1992) suggest that at least four factors distinguish early education and early childhood special education. *First*, early childhood special education focuses more directly on the attainment of specific goals. This means that the adults who work with these children must assess developmental and functional status, set goals to be attained, and provide an environment and instructional strategies most likely to ensure that these goals are achieved for each child. In many cases this means the teacher must take a more active and directive role in instruction than would typically be the case. *Second*, early childhood special education endorses a more specific family-centered approach than does early childhood education. Although family support is a goal for all children, early childhood special educators must work more directly with families in setting long-range and short-term goals for children, in determining strategies for helping children learn, and in providing additional family support services as needed and requested by families. *Third*, early intervention for young children with disabilities almost inevitably involves professionals from a number of specialized disciplines working together to provide a comprehensive intervention program. The provision of therapeutic services, either directly or through consultation, constitutes a primary difference between regular and special early childhood education. *Finally*, early intervention typically must focus explicitly on the skills and challenges embedded in the transition processes, such as the transition from home to child care or the transition from preschool to kindergarten. Often this means setting specific goals for transition and engaging in instructional activities designed to ensure that transitions are successful.

Wolery and Bredekamp (in press) discuss a number of contextual issues that should be considered in the context of the current debate about DAP and its relevance to early intervention. They argue that (1) the debate should focus on specific practices rather than on comparing disciplines (e.g., early childhood education versus early childhood special education; (2) there is considerable variability in the ways that both early childhood educators and early childhood special educators actually work with young children; (3) the theoretical and disciplinary basis as well as the goals of the two sets of practices are different; (4) concepts and knowledge about "best practice" continue to evolve and be studied; and (5) language complicates the issues being discussed because of multiple associations and uses of various words. Given that context, however, Wolery, Holcombe, Venn, and Werts (1992) list 11 areas of congruence between DAP and early childhood special education (ECSE) practices and describe instances in which some differences may occur. Both DAP and ECSE practices:

(1) recognize the importance of individualization and building early educational experiences on development;

(2) de-emphasize reliance on and use of standardized assessments;

(3) encourage the integration of assessment activities and curricular decisions and actions;

(4) recognize the importance and value of child-initiated activities and of using contextually relevant experiences;

(5) recognize the importance of active engagement and participation;

(6) emphasize social interactions with others and the development of social competence;

(7) value teachers' responsiveness to children's behavior and patterns of interaction; however, in ECSE practice, the teacher may well take more directive roles;

(8) are designed to promote learning and development; however, in ECSE practice, interventions may focus more directly on specific, identified, defined outcomes;

(9) recognize the importance of children's families; however in ECSE practice, the early educator's role in relation to families is much broader;

(10) recognize the need for professionals to be highly competent and skilled; however, in ECSE practice, more disciplines will be involved in planning, implementing monitoring, adjusting, and evaluating the program.

(11) recognize the need to address children's transitions from one program to another (Wolery et al., 1992, pages unnumbered).

It is likely that the debate over DAP and its relevance to young children with special needs will continue over the next few years. Hopefully the debate, and the research necessary to accompany it, will focus on specific practices and their relevance to individual children. In the final analysis, we all must recognize the legitimacy and importance of both perspectives. Each has much to offer about the nature of effective practices for *all* children. The key underlying effective and appropriate early experiences is that they meet the individual needs and learning styles of each child.

Recommended Practices for Working with Young Children with Disabilities

Given the above discussion, what do we know about effective practices in working with young children with disabilities? As in any field involving human behavior and development, the answer to this question is complicated, evolving, sometimes controversial, and value laden. Numerous books have been written on this topic (e.g., Bailey & Wolery, 1992; Bricker & Cripe, 1992), many research articles have been published, and a statement of recommended practices has been developed and validated by the Division for Early Childhood of the Council for Exceptional Children (Division for Early Childhood, 1993). It is beyond the scope of this document to review in detail every practice in working with young children. However, in the sections that follow we provide

a summary of changes that have occurred in our thinking about early intervention practices in a number of key areas.

Movement toward more complex theories of human behavior and development. A significant shift in early intervention over the past 10 years is an increasing appreciation of the complex nature of growth and development and of the forces that shape behavior and perceptions. Although learning principles as espoused by behavioral psychologists generally are still recognized as legitimate and necessary for designing effective intervention strategies, practitioners and researchers alike now generally recognize that behavior and intervention occur within a much broader context that inevitably exerts an influence on the ultimate outcomes to be attained.. Drawing primarily on the theoretical work of Bronfenbrenner (1977) and Sameroff (Sameroff & Chandler, 1975; Sameroff & Fiese, 1990), we now recognize that children live in a complex ecology that includes their families, the settings in which they spend time, and the non-family members (including professionals) with whom they interact. Change in behavior or developmental status occurs as a result of the complex interactions between children and their environment that occur repeatedly over time. In each of these interactions or transactions, all participants (children, teachers, families, therapists, peers) are seen as both shaping and being shaped by the experiences that occur.

A number of implications of this evolving theoretical perspective should be noted. Powers (1988) argues that a systems approach means that professionals be sensitive to the effects of services and interventions on the whole family, must attend to the organization and values embedded within family systems, and must be aware of the interrelationships between individual behavior and the environment. Bailey and Wolery (1992) take each level of Brofenbrenner's ecological model and describe implications for professionals, as depicted in Table 2. Underlying all of these recommendations is the concept of matching goals and intervention strategies to context.

Yoshikawa's (1994) review of the research on the effects of early family support and education on chronic delinquency and associated risks exemplifies the complexity of these models. The purpose of this extensive review was to assess the likelihood that early intervention could prevent or reduce chronic delinquency, to determine factors likely to contribute to prevention of delinquency, and to develop a theoretical model for justifying early prevention activities. His review suggests that early intervention indeed can be successful in reducing the risk for delinquency. Successful programs had four features in common. Each program (1) targeted multiple risk factors rather than a single one; (2) was ecological in its design and effect, working with both the child and the family; (3) focused on a low-income, urban population; (4) lasted at least two years; and (5) was implemented during the first five years of life. He postulated that the pathway or mediators of these outcomes likely reflected a combination of child-focused intervention activities and family/systems influences and supports. This work emphasizes the complex nature of the early intervention process and argues for a systemic model of intervention that addresses multiple dimensions of risk and disability.

Movement away from specific curricula to more individualized approaches to intervention. Initially early intervention was inundated with a number of curriculum packages. These packages typically included a list of instructional targets and occasionally also included instructional activities. Bailey, Jens, and Johnson (1983) reviewed 15 curriculum packages available in the early 1980s and found that they varied widely in terms of theoretical perspective, content, size, scope, and focus. Although these packages provided much in the way of useful guidelines for teachers, a number of problems became apparent. Bailey and Wolery (1984), for example, showed that curricula packages assumed to address the same developmental domains often focused on widely differing skills, indicating a lack of consensus as to what was important for young children to learn. Although a number of studies of curriculum models have been reported (Marcon, 1992; Schweinhart, Weikart, & Larner, 1986), rarely has there been any effort to evaluate

particular components of curriculum packages. Furthermore, the unique characteristics of many young children with disabilities have made it difficult to find a single curriculum that meets each child's individual needs.

Today it is generally recognized that the concept of curriculum must be broadly construed to include the environments in which the child spends time, the toys and equipment available in those environments, and the strategies that adults use to facilitate skill acquisition and use. Given this assumption, most programs do not rely exclusively on a single curriculum package. Rather the IEP or the IFSP becomes the focal point for developing an individualized curriculum or set of experiences designed to facilitate the achievement of those goals.

Movement toward more "naturalistic" teaching strategies. The roots of special education are deeply embedded in the behavioral tradition. In general, this tradition has served children with disabilities quite well, resulting in the implementation of many successful intervention programs. Although the veracity of behavioral principles is still recognized, practitioners, parents, and researchers alike have raised questions regarding the way in which these principles traditionally have been applied in working with young children with disabilities. A strong case for our behavioral roots can still be made (c.f., Strain, McConnell, Carta, Fowler, Neisworth, & Wolery, 1992), but problems in generalized skill use and concerns about perceived inconsistencies with what is viewed as developmentally appropriate practice with young children continue to be discussed. Bailey and McWilliam (1990) discussed this issue by characterizing three typologies of teaching:

1. Type A involves one-to-one instruction, the presentation of relatively constant stimuli in a massed trials format, continuous reinforcement, specific reinforcement, and errorless learning procedures.

2. Type B involves small group instruction, a distributed trials format, variable stimuli, possibly intermittent reinforcement, functional reinforcement, and some errors.

3. Type C involves a stimulating and responsive environment, models for appropriate behavior, allows some errors to occur, and capitalizes on children's initiations to teach functional skills. (p.39).

Although these typologies are presented as extremes, it is clear that there are different ways to teach children skills. Type A represents the classical way behavioral principles have been implemented. Type C represents the direction in which the field is heading. Bailey and McWilliam (1990) argue that each type of instruction is potentially legitimate and effective for use with young children with disabilities. However, they suggest that teachers select the strategy that is both the most "normalized" as well as the most effective for each individual child. Bailey and Wolery (1992) present a list of 10 potential intervention strategies that reflect the continuum of possibilities, ranging from structuring the physical environment to using stimulus modification and response prompting techniques. They suggest that strategies be selected that help children both learn and use skills, that integrate skills, that are effective, and that are appropriate for each individual child.

This movement toward more "naturalistic" intervention approaches is evident in several ways. For example, milieu teaching and incidental teaching techniques (Warren & Kaiser, 1988) have been well-described in the literature as methods for using behavioral principles but applying them in a context that builds heavily on children's interests and initiations and used functional consequences to shape and reinforce behavior. Bricker and Cripe (1992) have operationalized the movement toward more naturalistic approaches by describing an "activity-based" approach to early intervention. This approach is based on four essential components. First, it is a child-directed, transactional approach. This means that the child's interests are used as a way to begin an interaction and instruction is viewed

as an ongoing process. Second, training is embedded in "routine, planned, or child-initiated activities" (pp. 40). Thus an array of structures are provided, but the basic contexts for teaching are play and daily routines. Third, logical antecedents and consequences are used. Drawing on the child's expressed interests, the adult uses those interests to teach goals on the IEP or IFSP and functional consequences (e.g., child expresses interest in a toy, adult uses opportunity to prompt for a two-word utterance, child is reinforced with toy) to ensure learning. Finally Bricker's approach teaches skills that are useful and can be used in a variety of contexts.

The movement toward more naturalistic teaching strategies is consistent with some of the tenets of DAP and also has considerable research support. Interestingly, despite the concern that naturalistic strategies may be appropriate for children with mild delays but not those with more severe delays, several studies have shown the reverse, namely that children with more severe impairments are most likely to benefit from naturalistic strategies (Cole, Dale, & Mills, 1991; Cole, Dale, Mills, & Jenkins, 1993; Yoder, Kaiser, & Alpert (1991).

The identification of recommended practices. One of the most significant events in the recent history of early intervention has been the publication of recommended practices or quality indicators in programs for infants and young children with special needs and their families by the Division for Early Childhood of the Council for Exceptional Children (Division for Early Childhood, 1993). The document reflects a systematic process by which the membership of DEC, through working groups and surveys, developed and validated a set of guidelines designed to provide a framework for early intervention programs to define and implement quality practices.

The outcome of this process was a list of 447 indicators of quality in 14 areas: assessment, family participation, IFSPs and IEPs, service delivery models, general curriculum and intervention strategies, cognitive interventions, communication interventions, social skills and emotional development, adaptive behavior, motor,

transition, personnel competence, program evaluation, and giftedness. The significance of this document is that it reflects the first broad-based statement of quality related to early intervention for young children with special needs. Although the document will be challenged, modified, and clarified over the next few years, it represents a significant movement on the part of the field to establish broad-based standards for effective programming.

Future Needs

This chapter has attempted to summarize what is currently known about effective early intervention practices and to describe movements in the field today. We have argued that the legitimacy of early intervention is now well-established, both legally and in the research and practice arena. Like any field, however, early intervention continues to struggle with the question of what constitutes appropriate professional practice. In recent years, the debate in early intervention as centered around two areas: the role of families and strategies for working with children. Both debates have emerged from a recognition of the individuality of children and families and of the uniqueness of this developmental period both for children and families. Both have resulted in the advocacy of models of services that are responsive to the individual needs of children and families rather than being totally directed by professionals.

What is needed from a research perspective is more information on the implication of specific instructional models and techniques for young children with disabilities. The research on naturalistic teaching strategies has been intriguing, and more is needed. The relevance of developmentaliy appropriate practice seems apparent, but much more research is needed on the balance between direct instruction and naturalistic teaching. Finally, despite knowledge about quality and its implications for young children and their families, there is a substantial body of research documenting substantial discrepancies between typical practices and those being argued as recommended or best practices. For example, most of the studies cited in Table 1 found a relationship between quality and

outcomes, but also showed that the typical program for young children was of low quality. Bryant, Clifford, and Peisner (1991) found that only 20% of 103 randomly selected kindergartens in North Carolina met or exceeded the criterion of developmental appropriateness. Bailey Harms, and Clifford (1982) found that centers serving only children with disabilities rated significantly lower on global dimensions of the physical environment than did centers serving typical children. McWillam and Bailey (in press) found discrepancies between typical and ideal practices in integrating therapeutic and special education services into typical activities and routines. Bailey, Buysse, Edmonson, and Smith (1992) found discrepancies between typical and ideal practices in family-centered early intervention practices.

These and other studies suggest that despite our knowledge about recommended practices for children with disabilities, the extent to which they are implemented is not consistent with that knowledge. Thus research and models are needed for helping practitioners adopt and implement new strategies as they emerge in the field.

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Toy Play in Infancy and Early Childhood: Normal Development and Special Considerations for Children with Disabilities

According to the well-known Russian psychologist, Lev Vygotsky, a young child uses objects in his or her physical environment as tools to accomplish some activity, and the use of tools as mediators of activity is linked ultimately to the child's intellectual development and learning (Bradley, 1985). Toys and other play materials are probably the most common "tools" available during infancy and the early childhood period. Very early in development, toys dominate in children's daily activities and play a crucial role in helping young children construct meaning from their everyday experiences. Play with toys is thought to be motivated by children's interests in mastering challenging tasks, their natural curiosity to understand the features of toys and how they work, and their desire to interact with others who share similar interests in toys, all of which serve to support children's cognitive and social development (Bruner, 1972, 1973; Harter, 1978; Mueller, 1979).

Play with toys is also vitally important in the lives of young children with disabilities. Insufficient opportunities to participate fully in toy play deprive young children with disabilities of a normal part of early childhood and jeopardize their intellectual and social development along with their well-being and happiness. Fortunately, with appropriate adaptations to toys and the play environment, many of these children will be able to engage in meaningful encounters with toys and other play materials.

This chapter presents a review of the literature on toy play in infancy and early childhood, with an emphasis on both normal development and special considerations for young children with disabilities. Specifically, it describes children's encounters with toys within a developmental framework; it identifies characteristics of the child and aspects of the environment that influence toy preferences and the way in which children play with toys; and it outlines a set of guidelines that can be used by parents and professionals to

select the most appropriate toys for young children, including suggestions for adapting toy play for young children with special needs.

Development of Play with Toys and Materials

How young children learn to approach and interact with toys and materials is perhaps best understood in the context of play. The importance of play to educators and researchers is reflected in the prominent role it plays in early childhood curricula and myriad studies investigating the effects of play on children's intellectual and social development. Researchers have defined play in a variety of ways. Attempts to define play have generally included multiple criteria, with the most recent definition consisting of the following five criteria: nonliterality (i.e., using one thing to represent another), intrinsic motivation (i.e., a child's interests and curiosity), attention to means (i.e., focusing on "What can I do with it?"), freedom from external rules, and active engagement (i.e., full attention and participation) (Pellegrini & Boyd, 1993).

The elements of play described above apply to play contexts in which toys are present as well as those in which no toys are available. For example, a child who pretends to drink from a nonexistent cup and a child who uses a block to represent a baby's bottle are both exhibiting symbolism in their play. Furthermore, play may involve other people, but it can also occur in isolation. The efforts of early researchers to characterize these dimensions led to categorization schemes for two different but related forms of play: cognitive play and social play (Parten, 1932; Piaget, 1932; Smilansky, 1968). These schemes are summarized in Table 1. Dempsey and Frost (1993) point out that, with only minor adaptations by recent researchers, the merger of these two schemes into a nested hierarchy (Rubin, Maioni, & Hornung, 1976) "continues to dominate as a framework for the study of play" (p. 307).

Table 1. Cognitive and Social Play Categories

Cognitive Play

1. Functional Play — manipulating objects in a functional manner (e.g., dialing a telephone), combining objects, or repeated movements with objects (e.g., banging a cup and spoon together)

2. Constructive Play — product-oriented behavior (e.g., building a block tower)

3. Dramatic Play — pretense (e.g., pretending to feed a doll with a bottle)

4. Games with Rules — adjusting one's behavior to prearranged rules (e.g., board games, hop scotch)

Social Play

1. Unoccupied — not engaged in any type of meaningful activity

2. Solitary — playing alone

3. Onlooker — watching others play

4. Parallel — playing near but not with others

5. Associative — initiating or responding to interactions with peers

6. Coordinated — coordinating one's behavior with that of a peer

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At each stage of development, young children play with toys in a fairly predictable manner. A description of common forms of play during infancy and the preschool period follows.

Infancy. During the period from birth to approximately 2 years of age, exploration is the predominant form of play with objects (Pellegrini & Boyd, 1993). Initially, exploration of toys and other objects takes the form of indiscriminate mouthing and simple manipulation; however, in the course of development these behaviors are gradually replaced by functional play indicating knowledge of how toys should be used (e.g., pushing a toy vehicle), activities that involve the combination of two or more objects (e.g., placing one block on top of another), and various forms of pretense play which

signal the ability to use symbolic thought processes (e.g., pretending to eat with a spoon) (Belsky & Most, 1981). Another important milestone for a toddler is the ability to focus one's attention simultaneously on toys and people. Referred to as "joint attention" (Jacobson, 1981), this ability allows the child to engage other children or adults in toy play through simple exchanges such as offering and receiving objects or coordinated exchanges such as turn taking (e.g., patting a book using alternating turns).

Preschool period. Fantasy play, which begins during the second year of life and continues until the age of 5 or 6 when it begins to decline, is considered a predominant form of play during the preschool period (Pellegrini & Boyd, 1993; Pellegrini & Perlmutter, 1989). To encourage fantasy play, early educators commonly equip their preschool classrooms with commercial toys and props such as doctor kits and dress-up clothes and establish areas within the classroom for dramatic play (e.g., the housekeeping corner). According to Pellegrini and Boyd (1993), several characteristics of fantasy play during the preschool period distinguish it from earlier forms observed during infancy. First, compared to infants and toddlers, preschoolers tend to be other-referenced as opposed to self-referenced in their play with toys. For example, rather than pretending to brush one's own hair, a preschooler might brush a doll's hair or that of another child. Second, children's dependence on realistic props and toys to support "make believe" play decreases during the preschool years (Trawick-Smith, 1990). Indeed, an older preschool-age child is capable of engaging in fantasy play in the absence of any available toys or materials (e.g., opening an invisible door). Finally, whereas younger children tend to exhibit pretense behavior in the form of isolated acts (e.g., holding a cup up to one's mouth), preschoolers are capable of weaving these single acts into integrated play themes (e.g., playing hospital by telling a "sick" child to lie down and giving her some "medicine").

Development of toy play among children with special needs. A number of studies have compared the play characteristics of typically developing preschoolers to that of young children with disabilities (for reviews of this literature see Fewell & Kaminski, 1988; Linder, 1990; Mogford, 1977; Quinn & Rubin, 1984; Rogers, 1982). This research has concentrated largely on examining features of play characteristic of children with particular types of disabilities. Due to the variability within disability categories (e.g., mental retardation, autism, physical disabilities), much of this research is based on heterogeneous samples of children (Fewell & Kaminski, 1988) and does not take into account how individual characteristics such as motivation or temperament mediate toy play for all children. Research on toy play among children with disabilities has also been criticized for being of poor quality and producing inconsistent findings (Quinn & Rubin, 1984). Nevertheless, these data can be useful in helping adults understand how various types of disabilities commonly affect children's global play behaviors.

Young children with cognitive delays generally exhibit the same types of object play found in typically developing children and they follow a similar developmental sequence, but their pace is often delayed and the quality of their play may be reduced (e.g., decreased duration and frequency of involvement with objects) (Gowen, Johnson-Martin, Goldman, & Hussey, 1992; Johnson, & Ershler, 1985; Motti, Cicchetti, & Stroufe, 1983). Moreover, compared to typically developing preschoolers, children with cognitive delays use a limited repertoire of play behaviors, have a more restricted range of selected play materials (Fewell & Kaminski, 1988), and spend more time in unoccupied behavior (Linder, 1990). Stereotypic play behaviors are frequently present among young children with severe or profound cognitive delays (Linder, 1990). However, the development of play in young children with cognitive delays is generally congruent with their development in other areas.

Limited research on the development of toy play has focused on preschoolers who have other types of disabilities. Tait (1972a, 1972b; cited in Olson, 1983) found that

compared to their sighted peers, children ages 4-9 with visual impairments engaged in significantly more manipulative play, but they demonstrated comparable rates of symbolic play and other nonexploratory forms of play. However, other research has shown that young children with visual impairments as well as those with autism and hearing impairments have significant delays in the area of symbolic or fantasy play (Sigmon & Ungerer, 1984; Rogers, 1988). Largely because they cannot observe the play of other children, preschoolers with visual impairments are delayed in their abilities to imitate their peers, integrate single behaviors into elaborate play themes; and coordinate play with objects with social interactions with peers (Fewell & Kaminski, 1988; Linder, 1990). Initial exploration of toys among children with visual impairments may become stereotypic and take the form of mouthing or holding the objects against the face and eyes (Linder, 1990). Children with hearing impairments, on the other hand, do not generally exhibit delays in their play skills until after the first two years of life when children normally begin to use language and objects in representational play (Fewell & Kaminski, 1988; Linder, 1990).

For young children with autism and pervasive developmental disorders (PDD), deficits in the area of communication and sensorimotor integration contribute to a repetitive use of toys, a limited repertoire of play behaviors, and a lack of creativity and symbolic substitution of objects (Mogford, 1977; Sigmon & Ungerer, 1984). Young children with autism frequently develop a strong attachment to one particular toy, but the manner in which they play with the toy may be limited to spinning or some other stereotypic behavior (e.g., rocking, head banging, hand flapping) that precludes meaningful toy encounters as well as interactions with others.

Children with physical disabilities are apt to experience difficulty in locating and tracking objects in their environment due to poor head control; absent or poor locomotor skills preclude exploration and manipulation of toys and play materials; and the lack of fine motor skills prevents these children from reaching, grasping, and releasing objects (Linder,

1990). Due to their inability to move independently, children with physical disabilities sometimes appear to be more passive, less persistent, less engaged with peers and toys, and less motivated than their nondisabled counterparts (Fewell & Kaminski, 1988). As a result, without some form of toy adaptation, young children with motor impairments and physical disabilities generally spend less time exploring and playing with toys and more time looking at them (Brooks-Gunn & Lewis, 1982; Loovis, 1985). Subtle differences in the way high-risk, pre-term infants manipulate objects at nine months of age have also been observed (e.g., rotating, fingering, and transferring objects) (McCune, 1985).

Children's Toy Preferences

Hulson (1930) and Van Alstyne (1932) (both cited in Rubin & Howe, 1985), were two early researchers who investigated the "holding power," popularity, and use of various types of toys among young children who attended nursery school in the 1930's. These studies found that children generally preferred scissors, blocks, clay, and colored cubes over other types of toys. However, older preschoolers were more likely than younger preschoolers to play with these materials in a constructive fashion. Although there is a relative lack of research in this area, more recent studies have investigated children's preferences for toys and materials as a function of age, gender, socioeconomic status, and ability level.

Age. Toy preferences among very young children have largely been inferred based on the quality of their play and observations of how well they negotiate the environment. Dempsey and Frost (1993) identified several characteristics that could be used to distinguish infants' toy preferences from those of preschoolers, with one consideration concerning younger infants' preference for well-lit, open spaces as opposed to toddlers' preferences for enclosure. A second consideration noted by Dempsey and Frost is the need for younger children to have access to realistic toys and props, whereas older preschoolers appear to prefer a combination of "functionally ambiguous" (e.g., pegs, blocks) and "functionally explicit" (e.g., a typewriter) objects (Pellegrini & Boyd, 1993). There are

several reasons for this. First, as previously mentioned, older preschoolers rely less on realistic toys in symbolic or pretend play; and second, they are more capable of using toys in a variety of ways (e.g., using animal puzzle pieces in dramatic play) (Rubin & Howe, 1985; Trawick-Smith, 1990).

Gender. Due largely to social and cultural factors, gender differences in children's preferences for toys appear quite early in development, typically during the toddler period. Research has shown that adult caregivers, particularly fathers, influence young children's preferences for sex-typed toys (Bradley & Gobbart, 1989); that these preferences predispose children to play in groups that are segregated by gender (Pellegrini & Boyd, 1993), and these preferences are reinforced by peers as well as properties of toys that "pull for" certain types of behavior (Rubin & Howe, 1985). Caldera, Huston, and O'Brien (1989) observed 40 parent-infant dyads to determine if exposure to masculine, feminine, or neutral toys affected parent-child interaction. Not surprisingly, the study found that boys were more actively engaged with masculine toys (e.g., trucks; blocks), whereas girls were more involved in feminine toys (e.g., dolls, housekeeping materials); and both boys and girls rejected cross-sex toys. In this study, parents were found to be more involved and animated with same-sex as opposed to cross-sex toys. In addition, toy-type was associated with parental verbal behavior. Feminine toys elicited more teaching, praise, and questions from parents; whereas masculine toys elicited more animated sounds and negative comments.

The role of peers' gender in reinforcing same-sex behaviors among preschool children has also been documented. For example, Shell and Eisenberg (1990) found that 3-, 4-, and 5-year-olds attended to gender-neutral toys (e.g., slinkies, puzzles, wind-up toys) for longer periods when a number of same-sex peers were present as opposed to when these peers were only in general proximity. The study also found that boys' preferences for same-sex toys were more pronounced than they were for girls, a finding that is consistent with other studies (e.g., Carter & Levy, 1988). Due to the relationship

between early preferences for sex-typed toys and later intellectual skills (i.e., doll play among girls is positively correlated with later verbal communication skills; play with legos among boys is associated with later spatial-visual and math skills), it is generally advisable to provide opportunities for young children to play with a variety of toys (Dempsey & Frost, 1993; Rubin & Howe, 1985).

Socioeconomic status (SES). Research investigating the effects of class-differences on children's play has generally supported Smilansky's (1968) early work on this topic (Pellegrini & Boyd, 1993). Smilansky found that lower-SES Israeli children as opposed to their counterparts from middle-class backgrounds exhibited less complex and varied forms of fantasy play. However, Pellegrini and Boyd (1993) point out several considerations which raise questions about this line of research. First, most studies using SES as a variable have confounded race and class. Little is known, for example, about differences that might exist in play patterns among lower-, middle-, and upper-class African American children. A second problem noted by Pellegrini and Boyd is the failure to control for classroom variables such as type of toys, the role of adults, and peer group composition. The authors point out that, even when these factors are considered, children from "non-mainstream" cultures can be expected to spend more time exploring and manipulating toys which are unfamiliar to them, reducing the amount of time they spend in fantasy play. The question of whether culture or SES is a stronger predictor of how young children select and interact with toys has not yet been resolved (Dempsey & Frost, 1993). Vandenberg (1990) notes that although toys reflect cultural intentions, they also reflect personal intentionality by allowing children to construct and attach their own meanings, suggesting that individual differences in children's toy preferences are also an important consideration.

Ability level. Loovis (1985) evaluated toy preferences among preschool children with orthopedic disabilities. Toy preferences were ranked based on duration of play across 20 materials. The study found a relationship between cost and toy preference,

with children preferring the most expensive toys (e.g., tricycle, play gym, circus train) over the least expensive items (e.g., nerf ball, dressy bessy, threading block). Interestingly, toy preferences were not associated with gender, age, ambulation (i.e., ability to move independently from one place to another), or use of fine or gross motor skills. However, children spent more time engaged in toy play when preferred toys were available. Another important finding was that preschoolers with physical disabilities seldom played with toys in a manner that was consistent with their intended use.

Environmental and Contextual Variables

A number of conditions within (and outside) the play environment can influence how young children play with toys (Quilitch & Risley, 1973; Smith & Connolly, 1980). These conditions include the way in which the environment is arranged; the quantity, variety, and complexity of toys available; the presence of peers and adults; the curriculum; and television.

Environmental arrangements. Toy play is affected by environmental arrangements in group care settings. The use of learning or interest areas in preschool classrooms has been labeled a "fundamental practice" in early childhood education (Dempsey & Frost, 1993). A typical early childhood classroom is subdivided into well-defined play areas such as housekeeping (i.e., dolls, dishes, dress-up clothes, other dramatic play props), art (i.e., paints, crayons, clay, paper, scissors), library (i.e., books, tapes), manipulatives, (i.e., puzzles, peg boards), blocks, gross motor (i.e., climbing equipment, riding toys, rocking boat), and sand and water play. These areas are associated with particular forms of play in young children. For example, children who play in the block area tend to play constructively with materials (e.g., building roads and towers); while play with dress-up clothes in the housekeeping corner tends to elicit functional (e.g., putting one's arm through a sleeve) and dramatic forms of play (e.g., wearing a hat and pretending to be the "dad") (Pellegrini and Perlmutter, 1989). However, Pellegrini & Perlmutter (1989) reported that toy play within each of these learning centers was also

mediated by personal variables such as children's age and gender. For example, older preschool girls played in a less sophisticated manner with blocks than did younger preschool girls, suggesting the enhanced sensitivity to gender role expectations among older preschool girls.

The amount of available play space within the classroom, referred to as density, is another important consideration. Rubin and Howe (1985) suggest that decreases in play space have frequently been associated with a reduction in rough-and-tumble play and an increase in dramatic play. Therefore, if facilitating fantasy play among preschoolers is a program goal, it may be necessary to re-configure large, open spaces within the classroom. However, a potential negative effect of decreased space, that of more frequent occurrences of peer conflict and aggression, should also be considered in decisions regarding spatial arrangements (Dempsey & Frost, 1993).

Quantity, variety, complexity, and novelty of toys. Properties of toys such as quantity, availability, and variety can also affect children's play patterns. Young children require a sufficient quantity and variety of toys to minimize the number of conflicts that may arise and stimulate development; however, the availability of too many toys may inhibit social exchanges with peers (Dempsey & Frost, 1993; Olds, 1989; Smith & Connolly, 1980). Novelty is another important consideration. Although it is debatable whether novel toys stimulate exploration (i.e., simple manipulation) or play among young children, it is generally recognized that children can become bored with familiar toys unless these materials are replaced or rotated on a regular basis (Dempsey & Frost, 1993). There is also some evidence suggesting that novel toys may divert the attention of young children with disabilities away from their peers (Lieber, Beckman, & Strong, 1993).

Additional research has examined the effects of structure on children's toy play. Typically developing children generally use constructive forms of play (i.e., product-oriented play) with highly structured objects like puzzles and more creative and flexible forms of play with less structured toys. The absence of any "connotation of theme" in the

materials (e.g., clay, blocks), however, has been associated with less pretend play among young children (Dempsey & Frost, 1993). Ichinose and Clark (1990) reported that children with mental retardation preferred structured toys such as puzzles and form boards over open-ended materials such as blocks; they spent more time than typically developing children exploring, but not playing with, complex toys. Findings regarding their preferences for and play with reactive toys (e.g., jack-in-the box, battery operated toys), however, are mixed.

Research has also examined the effect of varying toy detail on play with toys. Robinson and Jackson (1987) found that, contrary to conventional wisdom, low-detailed replica cars did not produce more "holding power" over 4-year-olds who played with them, but added props in the form of roads did increase theme-related play. Varying car detail had no effect on children's versatility with toy vehicles.

Children's social behavior has been shown to vary as a function of the types of toys they play with (Hendrickson, Strain, Tremblay, & Shores, 1981; Quilitch & Risley, 1973). Toys that enhance social exchanges (e.g., turn-taking, physical assistance, dramatic play) are commonly labeled "social toys," whereas toys associated with playing alone are termed "isolate toys." Beckman and Kohl (1984) observed toy play and the frequency of social interactions among preschoolers with disabilities in integrated preschool classrooms (i.e., serving children with and without disabilities) and segregated settings (i.e., serving only children with disabilities). The children were exposed to three toy conditions: social toys (e.g., toy vehicles, blocks, puppets), isolate toys (e.g., books, puzzles), and a mixed condition consisting of both social and isolate toys. The study found that preschoolers with disabilities interacted more frequently with their peers in the integrated settings and higher rates of social interaction were associated with the social toy condition across both types of settings. These findings, which are consistent with results from more recent investigations (Cowden, & Torrey, 1990; Martin, Brady, & Williams, 1991), suggest that

toys and materials should be considered an important aspect of interventions designed to enhance the social behavior of young children with disabilities.

Adults and peers. Young children are also influenced by the way in which adults present toys and materials to them (Rubin & Howe, 1985), the manner in which they structure play with toys, and their general capacity to be nurturing and supportive (Howes & Stewart, 1987). Children who are encouraged by adults to play with toys in creative ways are more likely to exhibit flexibility and symbolism in their play; whereas children who are "instructed" to use toys in a particular manner are less apt to exhibit these more advanced forms of object play. Hupp, Boat, and Alpert (1992) reported that preschoolers with developmental delays exhibited higher levels of positive emotion when adults encouraged child-centered play with toys as opposed to a condition in which adults were more directive. However, children demonstrated similar levels of mastery behavior (i.e., goal-directed persistence) and success with toys across both conditions. Other research has shown that the popularity of the least preferred toy increases among preschool children when an adult plays with it or merely attends to children's toy play (Quilitch, Christophersen, & Risley, 1979 cited in Ichinose & Clark, 1990) and that children as young as 12 months old will play less with a toy when that toy is paired with negative maternal affect (Hornik, Risenhoover, & Gunnar, 1987).

The effects of peer familiarity and friendship on the quality of toy play has also been documented. Roopnarine and Field (1984) reported that preschoolers with friends were more likely to engage in fantasy play, verbalize to peers, and play in a coordinated fashion (e.g., direct their peers' activities and respond to requests) than were children without friends. In a related study, Doyle, Connolly, and Rivest (1980) examined the effect of peer familiarity on the social interactions of preschoolers and, like Roopnarine and Field, found more occurrences of dramatic play as well as higher levels of social participation and more complex toy play in a familiar versus nonfamiliar playmate condition.

More sophisticated and less isolated toy play has also been documented among young children with disabilities who are educated alongside their typically developing peers compared to those who are exposed exclusively to other children with disabilities (Beckman & Kohl, 1984, 1987; Guralnick, 1981). However, preschoolers with disabilities demonstrate particular deficits in the area of integrating symbolic toy play and social interactions with peers (Lieber & Beckman, 1991a).

Curriculum. Although it is quite likely that the early childhood curriculum affects young children's play with toys, at present the differential effects of various types of curricula on the development of object play are unknown. The National Association for the Education of Young Children (NAEYC) and the National Association of Early Childhood Specialists in State Departments of Education (1990) offer a set of theoretical assumptions and general guidelines for curriculum development that characterize teaching and learning as an interactive process: children construct their own knowledge through active learning and play, but they also learn a great deal by interacting with adults and other children. Curricula specifically designed to promote play behaviors in young children with disabilities such as Learning Through Play (Fewell & Vadasy, 1983) are described in Fewell and Kaminsky (1988).

Television. Argenta, Stoneman, and Brody (1986) investigated the effects of three types of television programming (i.e., cartoons, Sesame Street, and a situation comedy) on the play patterns of preschoolers. The study found that although cartoons and Sesame Street were equally preferred by children over the situation comedy, these two programs affected children's play with toys and peers in different ways. When children viewed cartoons, they were quiet and attentive and tended not to play with toys or interact with their peers. However, viewing Sesame Street resulted in active play with toys for boys and an increase in social exchanges for both boys and girls. The authors suggest that a clue for this finding may lie in Sesame Street's educational format which contains auditory and visual cues to inform children when highly interesting content will follow,

allowing children to divide their attention among their peers, toys, and television. The frequency of active toy play for boys and girls was highest during the situation comedy, children's least preferred program, and during a condition in which the television screen was black.

The effects of violent television programming on the social behavior of young children has interested researchers, educators, and parents alike. Potts, Huston, and Wright (1986) found increased attention to television programs with rapid action content, but not violent content, among boys ages 3-6. In addition, although prosocial toys (e.g., ambulance and paramedic figures, basketball and hoop) elicited cooperative play and aggressive toys (e.g., an inflatable Bobo doll, Star Wars figures) elicited "interpersonal aggression that went well beyond the direct demands of the toys themselves" (p. 13), evidence supporting the relationship between violent programming and aggression was weak. The authors concluded that the properties of toys and environments may counteract, or at least mediate, brief exposure to television programming with violent content.

Considerations in Selecting Toys for Young Children

Categorizing toys. Various systems exist to classify toys. These classification schemes vary depending on whether or not they are based on simple or complex toy characteristics. For example, toy manufacturers commonly suggest recommended age ranges for each product. Thus, toys can be grouped broadly as a function of their age-appropriateness. Researchers have also derived empirically-based classification schemes for grouping toys. Yawkey and Toro-Lopez (1985) presented two classification schemes for play materials. The first scheme consists of a descriptive typology summarized in Table 2. The authors point out that toys in this scheme are multifaceted, multifunctional, and multivaried and they suggest that toys from one category may be used in a manner which corresponds more closely to another (e.g., using constructive toys in a symbolic manner). Table 3 displays two additional classification schemes. Based on researchers' observations of children's play with toys, both systems reflect children's cognitive and social skills and

the sequential levels through which play develops. Yawkey and Toro-Lopez (1985) suggest that toy typologies may be useful for both children with and without disabilities in selecting toys that match children's individual characteristics (i.e., cognitive and social developmental levels) and determining how toys can be used to meet individual and program goals.

Table 2. Descriptive Toy Typology

Type	Purpose	Examples
Instructional Materials	Teach literacy & numeric skills, part-to-whole relationships, one-to-one correspondence, visual memory, & discrimination	Puzzles, stacking toys, nesting toys, pegs & pegboards, button boards, shoelaces, & zippering boards
Constructional Materials	Encourage open-ended, product-oriented play behavior	Unit and table blocks, tinker toys, lincoln logs, legos, dominoes, design cubes
Toys	Replicate or symbolize another object	Housekeeping, transportation, and animate (animal or people) toys including dolls & doll accessories, toy dishes & silverware, cleaning objects, & toy vehicles
Real Objects	Become play materials	Sand, water, wood, mud, cardboard boxes, clothing, pots & pans

Source: Yawkey & Toro-Lopez (1985)

Table 3. Empirically-Based Toy Typologies

McCune-Nicholich (1977):

	Level of Play	Play Behaviors	Toys Suited to this Stage
I.	Pre symbols schemes	Gestures, actions, or movements demonstrating recognition of use or name of objects	Mops, brooms, cups, dishes, baby bottles, toy telephones, combs, clothing
II.	Auto symbolic schemes	Self-related pretend activities	Baby bottles, cups, dishes & silverware
III.	Single scheme symbolic games	Pretend to be other individuals or objects	Dolls, baby bottles, brushes, combs, toy vehicles, & housekeeping objects
	&		
	multiple scheme combinations	Links together several related pretend schemes	Food cans, cardboard boxes, telephones, wood sticks, & paper
IV.	Planned symbolic games	Plan in advance the nature & characteristics of pretend activities	Dolls, doll accessories, adult clothing, other "unstructured" play materials

Yawkey (1983):

	Level of Play	Play Behaviors	Toys Suited to this Stage
I.	Simple play	Uses simple or repetitive movements, gestures, & vocalizations with objects	Toys that produce sounds, stacking toys, differently colored blocks, stringing sets, nesting toys, pegs & pegboards, dolls, & toy vehicles
II.	Fantasy play	Make-believe or pretend play	Dolls & doll accessories, legos, transportation toys, tooth brushes, combs, miniature replicas of cartoon characters, guns, knives, toy animals, tree branches, chalk, wood, & buttons
III.	Reality play	Reproduces real life situations	Realistic miniature objects such as tea sets, farm animals telephones, doctor & dentist accessories, & dolls

Source: Yawkey & Toro-Lopez (1985)

Toy libraries. Toy libraries exist throughout the world to provide parents and children with opportunities to play together with a variety of toys. Four major types of libraries have been identified: (a) community oriented toy libraries, (b) lekoteks or early intervention libraries for children with special needs, (c) toy libraries as cultural, social, and recreational centers, and (d) general toy lending libraries (Bjorck-Akesson & Brodin, 1992). In the U.S., community oriented toy libraries provide toys that may be checked out like books, typically operated through public libraries, mobile libraries, and public school libraries. Some of the services offered by Lekoteks or early intervention libraries include specialized staff, adapted toys and assistive technology for children with severe physical impairments, and computerized educational programs. The third type of program, toy libraries as cultural and recreational centers, are found mostly in European countries where there is an emphasis on traditional toys and games, including handmade toys. Toy lending libraries, the fourth type of toy library, are typically staffed by volunteers who donate and repair toys that are loaned to children living in poverty.

Parent preferences. Fallon and Harris (1989) studied features considered important by parents in the selection of toys for young children. Table 4 presents the ranking of these features in order of most to least important. The first two features, safety and instructional value, were significantly more important to parents than the remaining 15 factors. The study found no differences in parents' ratings on the basis of parents' gender, ethnicity, or whether or not they were parents of children with disabilities. A child's own preferences for particular toys is another important consideration in the selection of toys. In a related study, Christensen and Stockdale (1991) identified five features influencing toy selection patterns among mothers and fathers of preschool children: educational value, durability, parent appeal, flexibility, and child appeal. Parents of children with disabilities often face a dilemma in selecting toys for their children: should they choose a toy that the child will use and enjoy or select a toy that has therapeutic value (Exceptional Parent,

1993)? Because most developmentally appropriate toys can be considered "educational," selecting a number of toys that the child enjoys is likely to be the best strategy.

Table 4. Features Parents Considered Important in the Selection of Toys for Young Children in Rank Order

1. Safety
2. Teaches skills, creativity
3. Durability
4. Flexibility
5. Physical attractiveness to child
6. Length of time child attends
7. Age of child
8. Recommendations from others
9. Child requested toy
10. Information on toy package
11. Cost
12. I just like it
13. Novelty
14. Category, type of toy
15. Physical attractiveness to parent
16. Child's sex
17. Picture or advertisement

Source: Fallon & Harris (1989)

Safety. Safety is an important consideration in the selection of toys for young children. In a study of injury related to child care, toys were found to be the third most

hazardous product found in child care centers, although playground equipment (i.e., climbers and slides) was associated with the most frequent or severe injuries among young children (Aronson, 1983). The prevention of childhood injuries is a topic that requires further study. At a minimum, adults should adhere to age guidelines recommended by toy manufacturers and provide close supervision for activities involving materials or toys that have higher injury ratings. Additional safety guidelines recommended for child care programs serving infants and young children include: (a) eliminating objects with small removable parts, toys that have a diameter of less than 1/4 inch, latex balloons, plastic bags, and styrofoam objects for children under 4 years of age; (b) washing toys that have been mouthed by young children with warm soap and water; and (c) repairing or discarding toys that have sharp edges, breakable glass parts, or loose screws (American Academy of Pediatrics, 1993).

War toys. The question of whether or not young children should be allowed to play with war toys has been controversial, with parents and early educators frequently facing a dilemma about how to deal with children's preferences for such toys (Carlsson-Paige & Levin, 1987). Although adults express concern about the potential relationship between real and pretend acts of aggression, Connor (1989) suggested that aggression may only be "in the eye of the beholder." After viewing 14 videotaped incidents involving aggressive war play among preschoolers, preschool teachers classified each incident as aggressive, whereas male and female college students' responses varied depending on gender (i.e., males viewed fewer incidents as aggressive) and previous experience playing with war toys (i.e., females who had played with war toys characterized fewer incidents as aggressive).

Wegener-Spohring (1989) drew two conclusions from her research on war play based on interviews with 429 fourth-graders in Germany: (a) play with war toys almost always occurs among boys and not girls, and (b) the majority of war play involves "face-to-face" fighting with fantasy figures (e.g., soldiers, cowboys, pirates, Star Wars figures).

Interestingly, although war toys were banned in the kindergarten classrooms, the study documented occurrence of various types of "aggressive games," suggesting that, even without access to commercial war toys, children are capable of constructing their own props to carry out themes related to violence and aggression. The author cautioned against prohibition of war toys, suggesting instead that adults talk with children about their feelings associated with war play and adult desires for a peaceful world.

Based on their review of the war play literature, Carlsson-Paige and Levin (1987) identified two prevailing viewpoints among parents and educators of young children. The first, labeled the developmental view, links war play with children's needs to work on various developmental issues such as gaining control over their impulses, constructing boundaries between reality and fantasy, understanding another's perspective (e.g., alternating "good guy" and "bad guy" roles), and interpreting aspects of their world that children find frightening (e.g., war and violence). The second perspective, the sociopolitical view, states that play with war toys may encourage children to adopt militaristic concepts and values, and therefore should not be permitted. Of particular concern among those who hold this view, are recent changes in the media (i.e., an increase in violent television programming and the number of animated programs with explicit war themes) and the toy industry (e.g., the availability of war toys which correspond to children's television programs with war themes).

Carlsson-Paige and Levin (1987) present four options commonly used by parents and teachers as solutions to the war play dilemma --banning war play, adopting a laissez-faire approach, allowing war play with specific limits, and actively facilitating war play--and present a summary of guidelines and strategies that adults can use to actively facilitate war play, considered by the authors to be the best solution.

Selecting and Adapting Toys for Young Children with Special Needs

Without some type of adaptation or special consideration, many young children with disabilities may not be able to participate fully in toy play activities. Play assessment

can be used to identify the child's developmental level with respect to toy play along with goals and objectives for increasing the child's toy play skills. Assessment generally involves observation of the child's natural play behaviors and classification of those behaviors using a theoretical framework such as Smilansky's (1968) cognitive play sequence (see Table 1). A complete description of play assessment procedures based on various classification schemes can be found in Fewell and Kaminsky (1988). In addition to these, several play assessment instruments have been developed for use with young children with special needs. For example, the Play Assessment Scale (Fewell, 1984) includes procedures for scoring spontaneous play behavior to produce a play age as well as procedures for eliciting and scoring play at higher levels. Transdisciplinary play-based assessment (Linder, 1990) is another approach that is used not only to characterize a child's play with people and objects, but also to document delays in development in other areas, assist in determining service eligibility, and plan and evaluate intervention goals and therapeutic strategies.

Prior to selecting toys for a particular child, it is necessary to consider the child's special needs and abilities, aspects of toys or the environment that motivate the child, and the child's previous experiences with various types of toys. Guidelines for selecting toys and play materials for children with disabilities recommended by Bailey and Wolery (1992) are summarized in Table 5. As a general principal, the toys children are offered should include those that accentuate what they are capable of doing on their own (Exceptional Parent, 1993). Many "off-the-shelf" toys are commercially available and require no modification for children with disabilities. For example, in selecting toys for young children with hearing impairments, caregivers may want to consider toys that are visually reactive or those that provide tactile output (e.g., toy cash register). Children with visual impairments may enjoy toys that are pleasing to touch, that vibrate, blow air, or make interesting sounds (e.g., toy musical instruments). Children who have physical impairments may enjoy toys that offer interesting visual and auditory feedback in addition

to movement (e.g., battery-operated toy animals and vehicles). Reactive toys (i.e., those that move, emit light, make sounds, or are stimulating to touch) are particularly engaging for children with severe disabilities (Bambara, Spiegel-McGill, Shores, & Fox, 1984).

Table 5. Guidelines for Selecting Toys & Play Materials for Children with Special Needs

1. Toys & play materials should be responsive (i.e., toys that emit sound, movement, or light when activated by the child).
2. Toys & play materials should be age-appropriate. In general, toys and materials that are appropriate for typically developing infants, toddlers, and preschoolers are appropriate for young children with disabilities.
3. When necessary, toys and materials should be adapted to increase engagement and learning.
4. Play materials should include naturally occurring object such as boxes, kitchen utensils, and packing materials.
5. Toys and play materials should be selected to promote learning of important skills.

Source: Bailey, D., & Wolery, M. (1992). *Teaching Infants and Preschoolers with Disabilities*. New York: Merrill.

For some infants and preschoolers, however, it may be necessary to adapt or enhance toys to ensure that children are exposed to a range of interactive and reactive experiences and fuller participation than would otherwise be possible (Johnson, 1993). According to Langley (1985), simple modifications can be achieved by adding an element to the toy, stabilizing the toy, modifying the response mode, and through unconventional positioning of the toy. For example, plastic rings can be added to toys to facilitate the child's grasp; wooden knobs can be glued to toy parts to make them easier to manipulate; foam pieces can be added to page corners to make it easier to turn the pages of a book; and velcro can be applied to children's gloves or sweat-bands to make it easier for them to pick up, hold, and use toys (Langley, 1985; Pierce, 1993; Wright & Nomura, 1987). Suggestions for stabilizing toys include gluing magnetic strips on to toys which can be

positioned upright on a cookie sheet and adhering toys to surfaces using suction cups, c-clamps, dycem matting, and sandbags (Langley, 1985). Placing toys at an angle on an easel or adding velcro make some toys more stable and puts them within reach of children with limited range of motion (Goosens & Crain, 1986; Goosens, Crain, & Elder, 1992). To achieve unconventional positioning, Langley (1985) suggests that toys be suspended from the ceiling using a pulley or, if combining toys is the goal, using a hoola hoop to suspend multiple toys around the perimeter. Toys with "on" and "off" switches can be modified by adding a larger, pressure-sensitive electronic switch that can be used by any body part. Adaptive switches that can be activated by blowing on them, raising an eyebrow, or blinking one's eyes are available from a variety of commercial sources (see for example, Berliss, Borden, & Vanderheiden, 1989) or can be made inexpensively at home (Burkhart, 1980; Rappaport & Schulz, 1989). Adaptive switches can be installed permanently or temporarily, but temporary adaptations are sometimes frustrating for children and caregivers to use. They work inconsistently and special safety precautions are advised when using toys and devices that have been adapted with microswitches (Johnson, 1993). Detailed descriptions on the use of microswitches can be found in York, Nietupski, and Hamre-Nietupski (1985), Musselwhite (1986), Burkhart (1993), and Goosens et al. (1992).

Toy play can also be facilitated by making adjustments to the play environment. Rogers (1988) offers general strategies to enhance toy play among preschoolers with various types of disabilities. First, she suggests that it is important to expose children with disabilities to toys and materials that stimulate the most mature play levels of which they are capable. Second, the play environment (i.e., choice of materials, social grouping, and adult involvement) should be carefully arranged to reduce distractions and promote engagement with people and objects (Cavallaro, Haney, & Cabello, 1993). Third, play coaching emphasizing imitation skills and presymbolic forms of play (e.g., cause and effect, combinations) may be useful with some children. Finally, to assist children in

making the transition into more representational forms of play, it may be necessary to use direct-instruction techniques.

Because of the spontaneous, child-initiated nature of play, direct instruction to encourage it is rarely necessary among typically developing young children. However, infants and preschoolers with disabilities may benefit from a variety of adult-mediated approaches that differ along a continuum from facilitation to directiveness. In recent years, developmentally appropriate strategies emphasizing adult facilitation and "scaffolding" of children's naturally occurring play activities have been encouraged over more directive approaches. Although not specific to play skills, a great deal of research has been devoted to developing and evaluating various strategies for teaching young children with disabilities. Bailey and Wolery (1992) have categorized these approaches to include the following:

- arranging the physical environment to promote play, engagement, and learning;
- arranging the social environment to include competent play partners and responsive adults;
- using children's preferences for toys and activities;
- structuring daily routines and play activities (e.g., helping children agree on a play theme and assume play roles), adopting transition-based learning (i.e., presenting a learning opportunity during transitions between activities);
- using differential reinforcement, response shaping, and correspondence training (i.e., presentation of reinforcement under defined conditions);
- using trained peers to promote appropriate play and social behaviors;
- using naturalistic or milieu teaching strategies (e.g., responding to child-initiated play);
- using response prompting procedures (i.e., providing the child with assistance in making a desired response); and

- using stimulus modifications (i.e., changing the materials that elicit responses from the child).

The use of these approaches or combination of approaches to promote appropriate toy play among young children with disabilities must be individually determined. One example from the literature of an approach shown to be effective in teaching toy play to preschoolers with autism consisted of shaping and least-to-most prompting (i.e., beginning with no prompts and progressing to verbal directions, gestures, physical guidance) and redirection for inappropriate behaviors with toys (Lifter, Sulzer-Azaroff, Anderson, and Cowdery, 1993). Other suggestions from the literature for promoting full participation in play activities include adult-mediation strategies (e.g., questioning, encouraging, commenting, modeling, attending and responding to children's interests and intent, and adjusting the adult's response to match the child's ability) and peer-mediated strategies (e.g., peer imitation training, peer tutoring and coaching) (Cavallaro, Haney, & Cabello, 1993).

Finally, for the vast majority of young children with disabilities, increasing interaction skills and promoting social relationships with peers is an important goal of intervention efforts. Because play with toys is a fundamental context for social interactions with peers (Bradley, 1985), competent toy play should be viewed as a necessary precursor to social competence with peers. To assist young children with disabilities in coordinating their attention and behaviors with that of a social partner, Lieber and Beckman (1991b) recommend that adults select toys that encourage social exchanges and turn-taking with peers (e.g., puppets, balls) rather than toys that encourage children to play by themselves (e.g., books, puzzles); provide sufficient opportunities for children to play together in pairs rather than exclusively in groups; and expose children to competent play partners (i.e., typically developing children). In selecting play partners for young children with disabilities, adults should consider a child's playmate preferences in the same way that they consider the child's preferences for particular types of toys.

Implications from Research: Guidelines for Promoting Developmentally Appropriate Toy Play in Early Childhood

Based on implications from the research literature, we developed the following guidelines to assist parents and educators in making decisions about selecting developmentally appropriate toys and arranging the play environment in a manner that supports young children's happiness and general well-being as well as their cognitive and social development. Guidelines for adapting toys and the play environment for children with disabilities are presented last, since these suggestions should only be implemented if needed, after considering general guidelines for supporting normal toy play activities for all children.

Guideline 1. Consider children's toy preferences and individual characteristics. Children's toy preferences and their individual characteristics are important considerations in the selection of appropriate toys for young children. Even infants who are not yet capable of verbalizing can indicate their toy preferences through their nonverbal behaviors and vocalizations. For example, a child may gesture by reaching for a favorite toy located on a top shelf or offer a preferred toy to a caregiver to engage the caregiver in a favorite play theme. By observing a child's toy preferences, adults can determine if the child is interested in toys that elicit particular types of play behaviors (e.g., constructive toys like blocks and legos); or if the child is primarily interested in mastering challenging tasks, exploring features of toys and how they work, interacting with peers or adults, or some combination of these things.

In addition to identifying children's toy preferences, adults should consider each child's individual characteristics in selecting developmentally appropriate toys. The child's age, gender, socioeconomic status, and ability level are just a few of the child characteristics examined in this chapter. Others worthy of consideration include the child's temperament, motivation, cultural and ethnic background, and attachment history. In general, however, adults should think about the predictable manner in which young

children play with toys at various stages of development, with exploration being the predominant play form during infancy and fantasy play prevailing during the preschool period.

Guideline 2. Select toys that are durable, flexible, appealing, and safe. Along with child characteristics and toy preferences, consideration of these features should assist adults in making the best toy selections for young children.

Guideline 3. Identify individual or program goals associated with toy play. Although play with toys should be valued simply because it enhances the well-being of young children, it is also viewed as a means to an important end, supporting children's social and cognitive development. If an individual or program goal emphasizes the development of social interactions and relationships with peers, then toys that promote these behaviors should be made available to young children. Social toys include those that promote sharing, turn-taking, and pretense play. On the other hand, if cognitive development is the goal, age-appropriate toys that move children from the exploration and manipulation stage to more advanced levels of object play are preferred. Ideally, early childhood educators and parents will embrace both of these goals and, in addition, will support young children as they learn how to coordinate toy play with social interactions with peers.

Guideline 4. Recognize the influence of cultural values and beliefs on young children's toy preferences and play behaviors. To some extent, the way young children approach and interact with toys reflects their diverse experiences, cultural backgrounds and beliefs. Early childhood educators should aim to equip their classrooms with toys that reflect multicultural values, as opposed to providing toys which overrepresent a particular culture or socioeconomic group.

This chapter touched upon the issue of gender-typed toys, a topic of concern among some parents and educators of young children. Largely because of adult expectations, differences in the way boys and girls play with toys emerge early and are maintained

throughout a child's life. Although parents and educators may be reluctant to promote cross-gender toy play in young children, they should at least recognize the significance of their influence on young children's toy preferences, and the relationship between play with gender-typed toys in early childhood and later intellectual skills.

Guideline 5. Arrange the play environment in a manner that supports children's exploration and play with toys. A high-quality play environment supports children's exploration and play with toys. In arranging the play environment, adults should consider the physical arrangement of the rooms and play density; the quantity, variety, complexity, and novelty of toys that are available to children; and the social aspects of the play environment (i.e., peer group composition and number of adults). Depending on children's individual needs, an adult's role in providing a supportive play environment may include no intervention, prompted discovery and learning, or directed discovery and learning (Dempsey & Frost, 1993).

Guideline 6. Adapt toys and the play environment to meet the needs of young children with special needs. Special considerations are often necessary to ensure that young children with disabilities fully participate in toy play activities. Before making decisions about adaptations, adults should consider the child's special needs and abilities, aspects of toys or the environment that motivate the child, and the child's previous experiences with toys. For some infants and preschoolers with disabilities, "off-the-shelf" toys that are commercially available and require no modification may be sufficient to promote engagement, enjoyment, and learning. For many other children, however, it will be necessary to adapt or enhance toys in the following ways to expose them to a full range of interactive and reactive experiences:

- adding an element to a toy;
- stabilizing the toy;
- modifying the response mode; and
- positioning the toy (Langley, 1985).

Toy play can also be facilitated by making adjustments to the play environment (e.g., selecting toys that are stimulating but not overly challenging, arranging toys to promote engagement and reduce distractions, ensuring that competent social partners are available) and through adult facilitation. As mentioned previously, depending on the child's needs and the goals of the program, adult facilitation may range from careful arrangement of the environment to direct instruction using behavioral techniques that have been tested and validated by research.

Future Directions

In the same way that knowledge about the benefits of toy play has evolved over time, the types of toys that are available and valued for infants and young children will continue to change. According to Vandenberg (1990), at least two aspects of the present day world contribute to these changes. First, with the transformation from a predominantly rural to an urban nation, toy play has moved increasingly from outdoor environments into indoor settings: houses, apartment complexes, child care and community centers. Second, largely as a reflection of what one needs to survive in a "complex technological world," societal values have shifted away from an emphasis on physical abilities toward the need for critical thinking skills and the ability to access information. The types of toys and technology that are manufactured for young children in the future will likely reflect these and other societal shifts in values. Furthermore, the boundary distinguishing traditional toys from educational devices employing state-of-the-art technology is becoming less distinct. It now appears inevitable that interactive video and sophisticated computer software packages will be part of the "high tech" toy box of the future. Ultimately, the amount of leeway that young children are given will determine whether something is a toy or an instructional material (Vandenberg, 1990), or both.

At the same time, additional efforts are needed to ensure that young children with disabilities are able to participate fully in a wide range of normal toy play experiences. For a variety of reasons, these efforts should not focus solely on developing specialized,

adaptive toys and equipment. First, the number of adaptive toy and equipment catalogs that are currently distributed suggests that manufacturers already produce an ample supply of such products. Compared to toys that are marketed for nondisabled consumers, however, adaptive toys tend to be considerably more expensive, but are of similar or higher quality. Second, the exclusive use of specialized toys and devices that are different from those used and enjoyed by all young children reduces the extent to which toy play experiences for youngsters with disabilities can be considered normalized and developmentally appropriate. As a result, general toy manufacturers should consider how their products might better serve a wide group of young consumers with diverse backgrounds and abilities, including young children with developmental delays and other types of physical, sensory, and cognitive disabilities. One simple, but potentially effective strategy, would involve modifying toy packaging to include directions for how a toy could be adapted to meet the needs of children with disabilities. These directions could include information about how a toy could be augmented or simplified to enhance or reduce sensory output. For example, instructions could specify how toys can be augmented by attaching them to microchips which contain sound effects like those found in greeting cards. Instructions could also specify how toy simplification can be achieved by severing wires that produce unwanted blinking lights or loud noise. Of course, field testing these and other suggestions and obtaining consumer feedback are important considerations in the development of toy adaptation guidelines and strategies.

Finally, additional research is needed to determine how various types of toys and the properties of toys can be used to elicit desired responses in young children with disabilities. For example, it is currently unknown which toys facilitate mastery behaviors (i.e., goal directedness, persistence, engagement) in young children with disabilities and which are overly challenging (i.e., frustrating) at various developmental stages. Although reactive toys -- those that produce light, sound, and movement -- are generally considered therapeutic for young children with disabilities, aspects of reactivity that best facilitate play

behaviors and learning in these children are also unknown (Hupp & Abbeduto, 1991). Additional research is also needed to examine adult-mediated strategies that support and facilitate children's play with toys and peers. These efforts should focus specifically on helping adults make decisions about when it is appropriate to intervene, and if so, whether interventions should be more facilitative or directive in nature. Finally, since the vast majority of young children with disabilities have particular difficulties in the area of symbolic substitutions and fantasy play, strategies are needed to assist children in using toys in a more representational manner, and in coordinating their pretend play activities with social interactions with peers (Lieber & Beckman, 1991a). The remarkable ability of the social partner to enhance the learning and enjoyment associated with toy play is what makes this last consideration particularly important for all children.

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Technology Integration into Early Childhood Curricula: Where We've Been, Where We Are, Where We Should Go

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All 12 three year olds in Miss Duncan's class are excited because tomorrow is Jamie's fourth birthday and they've got work to do. Sarah, Jonathan, and Amy are making cupcakes. Sarah tells the other two children what ingredients to add to the cake mix by pressing the appropriate pictures and words on her augmentative communication device. Amy gets the cake mix, the water, and the egg and puts them in a bowl as directed by Sarah. Then Jonathan hits his adaptive switch with his chin to turn on the mixer to stir every thing together.

Over at the computer, Fran and Juan are making a banner that says, "Happy Birthday to Jamie." Miss Duncan helped them to spell the words and now they are making it beautiful by choosing the pictures they want from Big Book Maker (Queue) on the computer monitor screen. When Fran and Juan, who is just beginning to learn English, touch the TouchWindow (Edmark), the computer speaks their choice and any other words or letters they have typed in. Later on in the afternoon, Meg and Tim make a birthday card for Jamie at the computer using Bailey's Book House (). Meg, who's already 4, types "haby brda" and her name on the keyboard. Tim chooses the illustration for the card by hitting his switch, connected to the Macintosh LC II with a Ke:nx (Don Johnston) to scan through the choices.

The other children look at boxes containing videotapes and audio cassettes to decide what they would like to show during the party. Joe sings "Happy Birthday to Jamie" into a tape player so that Jonathan and Tim can hit their switches to activate the tape player and can sing to Jamie tomorrow, too.

This preschool classroom may seem futuristic but is in fact a compilation of scenes observed in actual preschool classrooms during the 1993-1994 school year (Koppenhaver, Pierce, Johnson, Stuart, & Yoder, 1994; Koppenhaver, Staples, Erickson, & Yoder, 1994). What is different about this classroom description and many other settings serving preschool children today from five to ten years ago is that children from many different backgrounds with varied and unique abilities and needs are being taught together. Inclusion of preschool children with disabilities into settings where typically developing children are educated is a universally accepted social policy and is required by public legislation such as the Individuals with Disabilities Education Act (IDEA) (Buysse & Bailey, 1993). Another major difference in the preschool classroom of today and those of a decade ago is the integration of technology such as televisions, computers, and video players into the curriculum. Projections are that nearly all licensed preschools will have access to daily computer use by then end of the 1990's (Goodwin, Goodwin, & Garel, 1986). Preschool children watch on the average of 25-35 hours per week of television, more TV viewing than any other age group (Clements, 1985b; Singer & Singer, 1981).

The use of assistive technology such as the adaptive switches, the special computer interface, and the augmentative communication device described above is also mandated by the IDEA and has made it possible for preschool children with disabilities to be more successful and participatory in included preschool settings (Beukleman & Mirenda, 1992; McCormick, 1987).

The use of technology with all young children can be a powerful tool which can facilitate cognitive, social, communication, and motor development (Buckleitner, 1994). This chapter will discuss three major types of technology: television, videos/interactive videodisc, computers and software, currently found being used more often as a part of the curricula for young children, ages birth through five years. This discussion includes how technology is used, its impact on developmental domains, and suggestions for improved development and use of technology with very young children. Assistive technology options and strategies for technology use with young children with disabilities will also be described.

What is Technology?

We live in a "techno-society." Every facet of our modern lives is assisted by use of some form of technology. We are awakened by a digital alarm clock that either plays music, speaks the time, or in some cases a message such as, "time to get up, sleepy head." Hopefully, our pre-programmed coffee maker has activated and is brewing while we use hair dyers, electric shavers, electric hair curlers. Our society has become dependent upon gadgets, technology, to work, learn, play, and live.

Technology is supposed to help us to do things better and quicker, or at least help us to enjoy our lives to a greater extent. The term, technology includes both a product, a tool, as well as the process of using the tool (Peck & Dorricott, 1994). Technological tools and their use to facilitate cognitive skill development was introduced with children as soon as technology itself became readily available. The High/Scope Curriculum Demonstration Project Study (Schweinhart, Weikert, & Larner, 1986) first began assessing the effects of

using computers with young children in 1978 and continues to update the literature on its findings and suggestions of software integration into early childhood curricula (Buckleitner, 1994; Buckleitner & Hohmann, 1987). Computer use in early childhood education became proliferate in the early 1980's to develop creative thinking and problem solving skills (Anselmo & Zinck, 1987). Other types of technology which have been successfully used in the education of elementary, middle, and high school students include calculators, two-way audio and video, telecommunications, and laser videodiscs (Hancock & Betts, 1994).

Assistive technology, the term applied to types of technology used with person with disabilities, had been discussed in educational and clinical literature since the early 1970's. Assistive technology has been coined the "freedom machines" (US Congress, OTA, 1988) that compensate for cognitive, sensory, motor, and communicative limitations. Assistive technology includes adaptations of generic devices (e.g., calculators that talk or have large numerals on the keypad); specialized equipment used with generic devices (e.g., an adaptive keyboard interfaced with a computer); and, dedicated devices that do what generic technology cannot do (e.g., portable augmentative communication devices, hearing aids) (Lewis, 1993).

Technology, then, currently refers to mechanized tools used to accomplish a task better, easier, faster, and/or more independently and includes anything from a can opener to a car. Any person of any age or ability uses some type of technology on a daily basis to accomplish a variety of tasks.

Early Concerns Regarding Use of Technology with Young Children

Clements and Nastasi (1993) discuss the trends that research on innovations usually follows. Reports in the literature usually begin with concerns about the innovation, "Will it be harmful? Will it replace what we already use or do?" These concerns usually turn out to be unwarranted so researchers then tend to begin looking at more specific use of the innovation: How, When, Where, and Why to use a new approach or material, and

specific content of the innovative strategy, material, or technology. Questions turn from "Do we use or do this?" to, "How do we do or use this?" and always, "What are the effects of using or doing something new?"

Descriptions of using technology with young children follow these research trends. Allowing or even suggesting that young children watch television or videos while at school or use computers at all was a question of tremendous concern and initial views were not as positive as those found in the current body of literature. Research during the 1980's was myopic in nature, looking at specific concerns and areas of skill impact that use of technology might and did have. Current research regarding technology use is more ecological in nature. How technology can be most successfully used, and what the human factors are in the success use of technology in the classroom is the focus of studies in the 1990's (Clements & Nastasi, 1993; Dwyer, 1994).

One area of concern in the use of technology that has been and continues to be studied, is the amount and content of television programming seen by young children. Children under the age of 18 months are on the average already viewing television for approximately 1.5 hours per day (Clements, 1985b; Singer & Singer, 1981). Children as old as 8-9 years do not understand the intent of commercials and are too trusting and vulnerable to the intent television advertising (Feshbach, Feshbach, & Cohen, 1982; Watkins et al, 1988). Even though television viewing was initially thought to be linked to hyper activity and attention deficits, opposites effects have been shown. Properly produced educational programming (slow-paced, structured) does not produce hyperactivity and increases attention and comprehension of program content (Clements & Nastasi, 1993). Effect of television programming not appropriately designed for young viewers will be described in a later section.

In the early 1980's many educators of young children were familiar with home personal computers but had difficulty generalizing the use of computers into their classroom curricula. Even though early researchers claimed benefits in using computers

with young children (Papert, 1980; Turkle, 1984), most practitioners were hesitant to replace, augment, or even generalize from traditional preschool materials like blocks, sandboxes, and water tables to computers (Anselmo & Zinck, 1987). Their basic questions was, "What can computers do that we aren't doing already?"

In addition to concerns regarding the value of using computers, early childhood educators were actually concerned about the harm using these "cold machines" might have on the social and emotional development of young children (Clements & Nastasi, 1993). Practitioners and researchers alike propositioned that children might not develop peer relationships or adult-child interactions if they spent large amounts of time using a computer. An overall concern for mechanized (computer) replacement of hands-on activities such as coloring with crayons, stacking blocks, or playing in a sandbox is mentioned in much of the early literature describing computers and preschoolers (Anselmo & Zinck, 1987; Clements, 1985a; Cuffaro, 1984; Tan, 1985). As late as 1990, teachers expressed concern that children in Head Start were "so far behind that they needed to concentrate on the basics, not using computers" (Hutinger, Robinson, & Johanson, 1990, p.32).

A mirror of these concerns was reflected by practitioners and researchers working with young children with disabilities. Use of augmentative communication devices for children not developing speech was viewed as a failure on the part of both the child and clinician (Attermeier, 1987) and was thought to interfere with speech development (Shane, 1992). Parents and professionals alike were concerned that using a computer and other assistive technologies might hamper communication and motor development (). Pre-requisites to using assistive technologies were developed to ensure that adequate trials of traditional methods had been given and to make sure that the child was ready to use a piece of technology (Shane & Bashir, 1980). These notions of technology use with children with disabilities were held during the first several decades of use and are still found in some part of the country even today:

- Exclusive use of assistive technology as opposed to traditional teaching strategies and speech or other motor skills;
- Assistive technology interferes with rather than enhances learning and function; and,
- Certain perquisite skills must be demonstrated by young children before assistive technology can be offered as an option to a child with a sever cognitive, communicative, motoric, and/or sensory impairment ,

These ideas became obsolete by the mid to late 1980's (Romski & Sevcik, 1988).

The disabilities field seemed to move quickly through the trends of research and practice concerns because by the mid-1980's use of assistive technology such augmentative communication devices with non-speaking children had become the expected approach to help foster communication skills (ASHA, 1991) . Computer use was also widespread to help children with disabilities to calculate and communicate in written and spoken modes.

In general, researchers, practitioners, and parents working with young children with and without disabilities expressed initial concern over using technology with children because they feared it would:

- replace existing "tried and true" materials and strategies;
- interfere with normal development; and,
- not be available or accessible to all children and therefore place disadvantaged children at an even greater disadvantage.

Current Technology Use and Developmental Impact

Initial researcher and practitioner concerns regarding using technology with preschoolers were on the whole un-founded. Overall, using computers, video, and television technology as an integrated part of a preschool curriculum fosters many areas of skill and ability in young children both typically developing and those with disabilities. The positive effects of using computers and television on child educational outcomes has been well substantiated (Clements & Nastasi, 1993). Technology options have not

replaced traditional preschool offerings, children seemed to continue to choose more movement-oriented activities (e.g., blocks, cars and trucks) over watching television using a computers (Anselmo & Zinck, 1987; and Hoover & Austin, 1986). Technology can be successfully integrated into preschool settings without decreasing engagement with more traditional preschool activities, with positive outcomes on child development (Clements & Nastasi, 1993). The following section describes the developmental impact the use of technology with young children as reported in the literature.

Television. The key to beneficial television viewing by young children is the quality of programs they watch and the amount of time spent watching television as opposed to being engaged in other activities. Educational television programming (e.g., "Sesame Street") has been found to develop specific skills such as alphabet and number naming (Ball & Bogatz, 1973). Piagetian concepts such as number conservation and seriation have also been taught through televised modeling of these constructs (Raeissi & Wright, 1983). Televised stories were preferred and fostered greater understanding, especially with teacher mediation in combination with the audio and video presentation (Choat & Griffen, 1986). Television viewing may help build background experience which aides in reading comprehension in young children form lower SES environments (Reinking & Wu, 1990).

The amount of time watching television can have deleterious effects. Television viewing amount is negatively correlated with oral and written language development (Clements, 1985; Nelson, 1973; Singer & Singer, 1993). Reading achievement is more negatively affected by significant amounts of television viewing (10-20 hours/week) in older children in intermediate grades, but moderate amounts of television viewing does not seem to negatively affect younger children in beginning stages of word recognition and decoding (Reinking & Wu, 1990). Children with higher IQs may be the most adversely affected group by higher viewing times (Williams, Haertel, Haertel, & Wallberg, 1982).

Type of television programming that young children view may also be linked to unwanted behaviors. Watching violent television shows has been unequivocally linked to increased violent, aggressive behavior in young children (Huesman & Malamuth, 1986). There is a growing body of evidence that supports a connection between television viewing, aggressive behavior, and poor achievement (Clements & Nastasi, 1993). The link is not known to be causal, but a combination of the following television viewing-related factors appears to put a child at risk for behavior problems:

- unlimited television viewing (no control for type of programming watched or amount of time of television viewing), especially during the preschool years;
- limited availability of other forms of entertainment (e.g., books, music);
- inability to distinguish television from reality;
- limited adult mediation regarding television programming (Huesmann, 1986).

To realize the effect that television programming has on child behavior, prosocial behavior has been increased in children who watch programs depicting positive racial relationships (Eron, 1986). Prosocial programming has also been shown to increase creativity and imagination (Singer & Singer, 1986). In general, television appears to offer influential role models for young children, especially when no other alternative are available (Clements & Nastasi, 1993). Through appropriate instructional television, children can view and discuss positive auditory and visual information they might otherwise not experience (Peck & Doricott, 1994).

Video Technology. Children as young as 3 years of age can independently operate a VCR (Linlof & Shatzer, 1990) and in most American homes where there is a television, there is also a VCR and a large collection of videotapes (Krendl, Clark, Dawon, & Troiano, 1993). Preschoolers report that they are permitted to independently choose and play tapes (Krendl, et.al., 1993). Videotaped movies or other programming may have the stop and start advantage but similar effects and caution must be given to this medium and has been described above regarding television programming. Even video games which

portray violent acts may foster aggressive behavior (Silvern & Williamson, 1987). Preschool children do not differentiate among videos, television programming, or taped television. To them, a television is a delivery system for all of these forms of media (Krendl, 1993).

Parents have reported that they engage in more prescreening activities and more monitoring of their children's viewing since the introduction VCR's into their homes. Their children the other hand do not report these changes but do indicate that their parents withhold video viewing for punishment and grant viewing for rewards (Kim, Baran, & Massey, 1988). Parental, primarily maternal, rules for video viewing, both content and time quantity, do exist, but are often confusing to preschool children, or at least enforced arbitrarily, i.e., children tend to be allowed to watch whatever they wish when their parents are busy (Krendl, et.al., 1993).

There is a plethora of instructional videos available today geared towards a variety of learners and subjects. Videos to teach 5-6 year olds self-protection were found to be superior in outcome to standard approaches (Poache, Yoder, & Miltenberger, 1988). Videodiscs put thousands of images and information at a child's finger tips and can transport a child to any environment for learning and discussion (Peck & Dorricott, 1994). Videodiscs are a relatively new addition to educational technology. Only about 21% of the nation's K-12 school districts have videodisc players available for teachers to use (Looms, 1993). Analysis of videodisc use has been done with older elementary and middle level students in content areas such as science. Findings are similar to uses of other types of technology, i.e., students make more significant gains in both the subject area as well as in ancillary areas such as self-esteem and a positive attitude toward learning when using this type of technology (Rock & Cummings, 1994).

New technology driven art forms include use of video production, digital photography, and computer-based animation. These techniques are highly motivating to students and encourage artistic expression (Peck & Doricott, 1994). These technologies

have been used in a Head Start program for families to develop and present videotapes about themselves to other families (Koppenhaver, Staples, et. al., 1994).

Computers and Software. Personnel working with the High/Scope Project found that a computer used with young children to be "a powerful learning device that facilitates cognitive development and positive social interaction without harm to young children" (Buckleitner & Hohmann, 1987, p. 338). In addition to developing the specific skills targeted in intervention studies such as comprehension, memory, and other "thinking skills" (Anselmo & Zinck, 1987) ancillary abilities were developed. Papert (1980) and Buckleitner & Hohman (1987) found that computer use helped children to move from concrete to symbolic representational thought. Anselmo & Zinck (1987) found that children developed early written and oral language abilities while using software chosen to develop memory and creative thinking. Hutinger, Robinson, & Johanson (1990) observed an increase in parental, especially paternal, interest and involvement in their Head Start program with the advent of computer use. A decade ago Walker (1983) found several positive aspects of computer use in the education of young children which included more active, independent learning with varied sensory and conceptual experiences. Today computers continue to foster a positive attitude towards learning (Clements & Nastasi, 1993).

In 1986, Apple Computers donated two computers to seven classrooms that represented a cross section of American K-12 students. One of the computers was for classroom use, and the other for the teacher to use at home. These Apple Classrooms of Tomorrow (ACOT) were also given technical support from local universities. In the eight years of studying the outcomes in these sites, significant educational, motivational, and social gains were documented. There appeared to a significant programmatic shift as well in these classrooms where technology was as an integral a part in instruction as were the students, the teachers, and traditional educational media. Dwyer (1994) describes this programmatic shift as going from "instruction to construction" as follows:

1. Classroom activities moved from very teacher centered, didactic presentations to more interactive learner-centered lessons.

2. Teacher's roles transformed from expert to collaborator.

3. Student's role also became more collaborative in developing and implementing learning activities.

4. Instruction emphasis moved from fact memorization to problem solving and analysis skill development.

5. Progress was evaluated more by quality rather than quantity of output and criterion-referenced and portfolio assessments became the standard practice of assessment.

6. Computers were used less for drill and practice activities and more for communication (e.g., information access and expression) over the eight years of use in the Apple classrooms.

Computer use impacts on practically every skill from each developmental domain from eye-hand coordination (Ziajka, 1983) to speaking French (Cohen, 1993) has been discussed in the extant literature. Major areas of impact of computer use discussed in the literature include cognition, language, mathematics, and social/emotional development and are briefly reviewed below.

Cognition. Chin (1984) and as mentioned previously, Anselmo and Zinck (1987) increased cognitive abilities such as memory, spatial and logical problem solving in preschool children by using computers and software available at that time (e.g., Apple LOGO™, 1983; Ernie's Quiz, 1981). Cohen (1993) reported gains in preschool children's self-learning, self-organization, memory, and concentration through using a computer with speech synthesis.

Oral Language. Oral language production, as measured as number of spoken words per minute, is almost twice as high at the computer than during other activities such as block play (Muhlstein & Croft, 1986), and is especially high for preschool children with disabilities (McCormick, 1987). Cohen (1993) used computers and a software package

that presented written then spoken words to teach French to 3 & 4 year olds. She reports development of spoken language via use of a speech synthesizer and computer because the computer became a new "playmate, a voice" which was very motivating and encouraged commenting and discussion among the children (p. 27). Anselmo and Zinck (1987) in their computer use study found that children often taught one another how to use menu items and prompts on new pieces of software as they figured out different abilities of new pieces of software.

Written Language. As soon as computer technology became accessible to preschool programs, it was used to develop literacy skills. Perhaps this function seemed most logical because of adult familiarity using computers for word processing. During the first decade of widespread computer use with young children, drill and practice activities to develop "readiness" skills such as letter naming and beginning word recognition dominated the scene (Fitch & Sims, 1990). Perhaps adults felt that children needed to use computers for a watered-down, skill specific literacy function. In the early to mid 1980's, educational researchers began discussing emergent literacy which viewed children's early scribbling and invented spelling as real, not prerequisite readiness behaviors (Sulzby &Teale, 1991). Another hallmark of the emergent literacy movement is the belief that preschoolers must observe and be engaged in literacy-related activities in which reading and writing is used to accomplish real goals, e.g., making a grocery list, following a recipe (Teale & Sulzby, 1989).

Using literacy to accomplish real tasks gave the computer a new role in the education of young children-story reading and writing. Children using word processors, especially talking word processing software and who have teachers scaffolding or providing the support for parts the children cannot do, write more, are less worried about making mechanical errors, make fewer mistakes, and produce high quality content (Clements, 1987). Word processing with computers seems to support a constructive writing process and invented spellings, more so than when children write with traditional

tools (e.g., pens, pencils, crayons) (Cochran-Smith, Kahn, & Paris, 1988). In general, children who write with word processors seem more motivated to write than when they just have pen and paper (Guidemi & Mills, 1989).

Cohen (1993) reported development of second-language writing abilities in preschoolers through use of a talking word processor. The program used in this study, Composition (1985), presented words first then the picto-graphic representation of the words after the child chose the words. The words, letters, and pictures were spoken through the voice synthesizer. She reported that children, ages 3-6, developed writing skills as they were "able to send their stories to others, and this gave them an experience of the functionality of written language" (p.28). Cohen even goes so far to say that in this study of teaching French to non French speaking preschoolers that written language developed before spoken language. She felt that through use of a computer with a voice synthesizer and software that connected print and graphics that the children, "wrote to read, read to speak" (Cohen, 1993, pp. 27).

In an earlier study, Anselmo and Zinck (1987) were initially concerned how non-reading preschool children would use the software they had available to them at that time. They planned to make picto-graphic representations of the written menu and directional items. They discovered, however, that the children had mastered using the keyboard letters for the commands they needed with several weeks and could independently select necessary menu items within several months without direct instruction. The children were reading, comprehending and using, letters and words in a context needed to control their environment, i.e., to use the software.

Overall, children tend to write and tell longer and more elaborate stories about computer graphics than they do about static pictures (Riding & Tite, 1985; Warash, 1984). Children also talk, draw, and write more with open-ended rather than drill and practice software. When using alphabet naming software and an alphabet book with their parents,

preschoolers were found to be interactive while their parents looked at the book with them (Worden, Kee, & Ingle, 1987).

Mathematics. As in other areas of educational development, computers have significantly increased preschoolers' early math concepts such as shape recognition, counting, and sorting (Clements & Nastasi, 1993). Similar caution should be taken in computer use to develop mathematic abilities as has been noted in other areas: drill and practice activities should be used sparingly and only after a concept has been learned through manipulative and other modes of experience (Clements & Nastasi, 1993).

Social/Emotional. Perhaps because this domain was of greatest concern when computer use with young children was initiated, more studies were found regarding social and emotional growth than any others. Over a decade of research indicates that children often develop a sense of self-efficacy, self-esteem, and overall satisfaction with their performance when using computers (Barnes & Hill, 1983; Swigger & Swigger, 1985; Cohen, 1993). Their self esteem helps them in their interpersonal relationships as well (Donohue, Borgh, & Dickson, 1987). Young children actually prefer to work at the computer in pairs or small groups and much cooperative learning has been observed in relation to computer use (Dwyer, 1994; Shade, Nida, Lipinski, & Watson, 1986). Cooperative work at the computer is fostered by type of software (e.g, open-ended exploratory and problem solving software as opposed to drill and practice types), teacher mediation (setting cooperation rules, explaining software function and features), and child familiarity with hardware and software (Clements, 1993).

Early computer use is felt to decrease the slight gender differences in computer use seen among older elementary and middle school children (Clements & Nastasi, 1993). These gender differences include a tendency for boys to use computers more than girls (Lieberman, 1985) and greater overall computer competency exhibited by girls (Jones, 1987).

Factors Affecting Successful Technology Integration.

In spite of the tremendous positive impact that has been reported over the past decade in regard to the use of technology in the education of young children, this impact has been less than prophesied and teachers, for the most part, continue to use traditional materials and strategies (Means & Olson, 1994). They teach the way they were taught (Smith & O'Day, 1990). Why isn't technology being used more effectively and consistently with young children? Barriers and bridges to effective integration of technology as a tool and a process in early childhood curricula implementation is summarized below.

Television/Video Technology. These two areas are combined because reports of use with young children are limited and cautions and kudos for their use are similar. Interactive television and video development and use has encouraged communication skills in kindergarten children. Children were helped to write and present news, stories, and plays and then watch and discuss their presentations (Curtin, et.al., 1994). These children appeared to learn and communicate information when they new it would be heard and viewed by other.

The major cautions as indicated above is to limit school use of commercial television/video viewing to programs which are educational in nature and which augment a goal, concept, or theme in the curriculum. Parents should be informed of the dangers of too much unlimited television viewing, especially when there is no adult mediation of program content. VCR's can be used to control children's access to content by providing only appropriate videos for viewing. Access to use of technology along with parental support and instruction can empower even preschoolers with knowledge and skill to control their environment and to make better choices for their own entertainment (Krendl et. al., 1993). The simple VCR can be an early technology that young children can use as a tool to achieve a purposeful goal.

Choat and Griffen (1988) suggested that videotaped television programs are superior to children watching programs as they occur because they may be stopped for

discussion. These pioneers in use of electronic media for educating young children refer to use of VCR' as a poor-man's Interactive video. Teacher and parent mediation of television viewing can be greatly facilitated by showing pretaped programs on a VCR and stopped, started, and rewound or fast forwarded to emphasize points of discussion. From the limited information available on video use with preschoolers, the following suggestions for use have been gathered:

1. Small group rather than whole class viewing of the video;

2. Previewing with frequent stops for children to discuss and ask and answer questions;

3. Independent control of video viewing by the child so that he or she may stop it for discussion, fast forward or rewind it to find favorite parts (Choat & Griffen, 1988).

Commercially available videodiscs and laser discs suitable for preschool children are limited. Readers are referred to the California Index of Instructional Video for current listings of this type of educational media.

Computers/Software. Descriptions of how computers are actually used in a preschool classroom are less clear than are reports of computer use effectiveness. Computer use studies fall along a continuum of a separate activity center offered as a choice just like blocks or house keeping centers to a more integrated tool used to type and print the classroom news as it is dictated by the children to the teacher during morning circle (Anselmo & Zinck, 1987; Buckleitner & Hohman, 1987). Donohue, Borgh, & Dickson (1987) offer a more in-depth description of how computers were introduced to children and teachers in 24 day care centers. Computer use was formally taught to individual children or mall groups of 2 -3 children. The children used computers at their or their teacher's request in pairs with adults loading software, showing children how to use a new piece of software and then allowing children to use the computer on their own. Interview data gathered through this study revealed that the following characteristics must be in place for successful integration of computers into a preschool curriculum:

• One person on staff at a preschool must assume responsibility for the computers and software but train and involve others in decision making regarding software selection and how computers will be used;

• Clear goals on how computers will be used to support the existing curriculum must be established and software that will support these goals purchased;

• Operational guidelines regarding times for use, levels of adult supervision needed, and set-up, operation and problem-solving must also be established as computer use is introduced into a preschool setting (Donohue, Borgh, & Dickson, 1987).

Developmental impact appears to be greater when the computer is used as a support to an active learning environment, not as an end goal in and of itself (Buckleitner & Hohman, 1987; Donohue, Borgh, & Dickson, 1987). To learn to use a computer would not be an appropriate goal, but to learn to write, draw, talk, read, count by using a computer would be more effective and appropriate for young children. Computers should not be used for drill and practice, electronic worksheet activities, but as tools to accomplish real purposes and to allow children to explore (Clements & Natasi, 1993). Current efforts at educational reform are developing more collaborative and constructive educational environments. These settings provide a better match for the integrated use of technology as a tool to accomplish real tasks (Means & Olson, 1994).

Buckleitner & Hohman (1987) also suggest that children learn best when taught a concept with manipulative materials first before showing them how to do an activity targeting the same concept on the computer. They introduced approximately 1 new computer activity per week within their preschool in this manner. Anselmo & Zinck (1987) found that the children used the computer for longer periods of time and more effectively when left to explore software on their own. They did indicate, however, that younger children (age 3) may have used the computer more with some direct instruction. In general, older preschoolers (4 years and older) appear to be more engaged during computer play than younger children (Clements & Nastasi, 1993; Hoover & Austin, 1986). Younger

children still benefit and seem to enjoy using computers but need more direct instruction and more time to learn to use software and keyboard commands.

Another important factor in effective use of computers and appropriate software is teacher and other staff training and time to experiment with hardware, peripherals, and software themselves (Buckleitner & Hohman, 1987; Donohue, Borgh, & Dickson, 1987). A decade of research continues to indicate that parents and practitioners need intensive training and technical support on the most appropriate and effective ways to use technology as a tool for learning and independent function. In preschool programs where teachers have not received preliminary and follow-along training, use of computers has been tenuous at best (Hutinger, Robinson, & Johanson, 1990). Approximately seven years of support, planning, and training are needed before teachers fully integrate computers and other technology into their curricula (Sheingold & Hadley, 1990). Teachers continue to question spending on computers rather than traditional educational materials because their computers are turned off more than they are turned on. Some teachers report that computers were purchased for their classroom in response to parental demands rather than in response to their own requests (Peck & Dorricott, 1994). These teachers have not had adequate training on the potential of computer use and more importantly, on how to use computers effectively within their classrooms.

We have found that teacher familiarity, confidence, and skill in choosing software and integrating into the curriculum is dependent upon teacher training and time for self-directed exploration and learning (Koppenhaver, Staples, et.al., 1994). Parents and teachers who regard a computer as an effective personal tool for themselves are more likely to embrace and use this technology with young children (Hutinger, Robinson, & Johanson, 1990). These factors also significantly effect the quality and quantity of technology use with today's preschool classrooms (Koppenhaver, Pierce, et.al, 1994). When computers were first introduced into the schools, they were placed in labs to limit access and thus control when and how students used them (Betts, 1994). Even today,

computers in preschool classroom are being used primarily as an assigned center-time event with non-integrated activities such as game playing or exploration with little interaction or explanation, activities found to be less effective in the earlier literature (Koppenhaver, Staples, et. al., 1994).

Perhaps computers continue to be used as an end instead of a means to an end because educators have not yet headed advice in 1987, educators must determine goals and expectations for computer use realistic and relative to the curriculum (Anselmo & Zinck, 1987; Buckleitner & Zinck, 1987; Donohue, Borgh, & Dickson, 1987). In the ACTT (Activating Children Through Technology Curriculum) children do not use the computer as an electronic worksheet doing drill and practice activities, but draw write, and explore in thematically related activities (Hutinger, Robinson, & Johanson, 1990). For example, when studying turtles, the children dressed up like turtles, read books about stories, and then played a computer game that featured turtles moving through a maze. The most effective uses for computers for young children include developing early writing, creativity, and artistic abilities, fostering comfort in a technology driven society, and freeing teachers for more human interaction and development of better learning environments (Peck & Dorricott, 1994).

In addition to appropriate goals for computer use and sufficient staff training, beneficial use of computers is dependent upon appropriate software selection. At last count there were approximately 500 pieces of commercially available software deemed appropriate for use with preschoolers (Buckleitner, 1994). Buckleitner, author of the High/Scope Buyer's Guide to Children's software, suggests that preschool classroom software libraries should contain at least four types of software:

1. Some programs that focus on early skills such as letter recognition and counting. This type of program should be used as for highly successful practice after children have learned a concept through more traditional approaches (e.g., manipulatives).

2. Open ended tools such as writing and drawing software (e.g.,Kid Pix by Brøderbund and Kid Works 2 by Davidson);

3. Playful exploratory programs that teach concepts with entertaining animated graphics and which give positive feedback and foster success. There are no right and wrong answers in exploratory software. These programs often offer a choice of exploratory (touch a letter hear its name) and question and answer formats (e.g., The Playroom by Brøderbund). Good software that has a question and answer format scaffolds or leads the child to the correct answer by giving cues and positive rather than negative feedback.

4. CD-ROM story books which feature instantaneous animation, sound, and voice output when the child selects any item on the screen (e.g., Just Grandma and Me by Brøderbund) (Buckleitner, 1994)..CD-ROM storybooks allow children to read at their own pace, repeating lines of text when desired, having the computer speak words they do not know, and to manipulate characters within a story. CD-ROM offers a wide range of teacher control options such as language the text is spoken in or if the story is read aloud at all. Parham (1993) offers a thorough review of CD-ROM stories and their features that are currently available.

These types of software can be used by a variety of children for several purposes. Choosing good software from the vast array that is available depends upon the goals planned for computer/software use and the children who will be using it. Most children can use any type of software but certain characteristics make some software more appealing to children, and other characteristic make some software more appealing to their parents and teachers. The following guidelines should be considered when evaluating software:

• Should be "child friendly". Programs appropriate for preschoolers should be easy for them to use by offering simple picture menus and meaningful icons (e.g., pencil eraser for "undo" function);

• Should be flexible enough to meet a variety of educational needs and goals. As mentioned above, the better software programs feature a range of exploratory and drill and practice options, both of which are success oriented and offer positive feedback and cueing.

• Should be colorful, animated, quick to respond. Young children prefer action oriented software and programs that talk and have other sound effects..

• Has teacher control options. Many good programs are available that have controllable features like color or sound control and language in which the menu is presented. Teachers may format the program to meet different child needs and preferences. Some of the newest pieces of early childhood software also keeps records of student performance.

A list of literacy software currently being used with preschool children with and without disabilities by staff at the Center for Literacy and Disability Studies is included in the appendix along with software resources and an evaluation form. Buckleitner (1994) highlights newest innovations in software for other areas of preschool education.

Assistive Adaptations

Assistive technology has been used with young children with disabilities for over thirty years to help them to learn and to independently care for themselves, move, communicate, and otherwise control their environments. Technology is especially critical for these youngsters because it is necessary to help them to function as independently and as effectively as possible. Lewis (1993, p. 7) conceptualizes the benefits of assistive technology use to children with disabilities by the "ABC Model: Augment abilities, Bypass of Compensate for disabilities."

An area of concern which may be ameliorated by using both technology and assistive technology with young children with disabilities is their limited range of educational experience (Cosden, Gerber, Semmel. et.al., 1987). Up until recently, most children with disabilities were taught in self-contained settings with prescribed educational

goals based on diagnostic information. While this approach may have individualized instruction, a variety of information and experience was not as available to these children as it is for children in mainstreamed classes. The vast menu of computer software and educational television programming may provide some vicarious experiences to children with disabilities. Adaptive access to the computer and interactive video may help children with severe physical impairments feel some control over their environments.

Television. Most of the information available regarding television use in the education of young children with disabilities falls within three categories: (1) physical access for children with physical impairments to independently control televisions, (2) the use of closed-captioned (CC) television with children who are hearing impaired, language impaired, or learning disabled to increase literacy skills, and (3) closed-circuit television magnification.

Physical access to television controls may be achieved by adapting a remote control device or by purchasing a commercially available adapted remote control through resources such as Toys for Special Children. Users are cautioned at using television videos for teaching or providing practiced for adaptive switch activation. Beginning switch users are sometimes set up in front of a television which is plugged into a timer unit (e.g., the Power Link from Ablenet). The television or video will stay on for a certain amount of time determined by a teacher or therapist. The child will watch the program, become engaged in it, and then it will turn off. The child will have to hit his switch to reactivate the TV. Even though well intentioned therapists and teachers may think that they are teaching cause and effect or early switch use with a strong motivator, but it has been our clinical experience that this activity frustrates a child and he or she soon looses interest in the video or program and discontinues using the switch. Other cautions for using adaptive switches are included in Buysse (this volume).

Closed-captioning of television programs was originally developed for adults with hearing impairments. Closed-captioning prints near-verbatim renderings of what is being

said on the screen. Audio-captioning for persons with visual impairments is also become more readily available on commercial television. Audio-captioning provides a subtle voice over description of what is occurring visually on a screen. Closed-captioning has been successfully used with elementary and middle school students with learning and language impairments to improve reading (). As reading ability develops, however, closed-captioning can become confusing for children who hear as well as see because the text does not match speech output word for word.

Closed-circuit television (CCTV) magnification enlarges any type of reading materials so that they may be read by persons with low vision. CCTV uses a camera with a zoom lens, a monitor, and a viewing table. Images can be enlarged to meet user visual needs (Lewis, 1993).

Video Technology. Much of the information in the literature concerning use of video and interactive video with persons with disabilities centers around teaching life skills to high school aged students. Significant advances in their problem solving, communication, and other "life skills" using interactive videodisc and teaching strategies have been reported (Browning, Nave, White, & Barkin, 1985). Interactive videodiscs were also used to teach social skills to elementary students who were deaf. These students received higher peer acceptance than those taught social skills through more traditional means (Thorkildsen, 1985).

Videos have been used to develop early literacy skills with two groups of children with disabilities. First, children with severe hearing impairments whose first language is American Sign Language are taught to write captions for videotaped stories which are told in ASL. They type their captions into a caption machine which super imposes print at the bottom of the screen. These elementary age children are helped with corrections and revisions of their captions (Kelly, et.al., in press).

Use of interactive videodiscs with hearing impaired youngsters has received favorable attention over the past several years. Nearly a decade ago, Jones (1986)

developed four interactive videodisc to teach verb tenses, reading comprehension, and basic reading and writing skills to young deaf children. Another disc was designed to teach British Sign Language to the hearing parents of deaf children. Stewart (1991) also used videodiscs to teach sign language to the hearing friends of deaf children as well as English language syntax to American Sign Language (ASL) users. Use of these videodiscs produced significant results and were felt to be superior to traditional teaching methods because action and language could be more closely linked via this technology. A little more recently, Hanson & Padden (1989) and Copra (1990) used interactive videodisc technology to develop English literacy in deaf children who used ASL as their primary means of communicating. These discs allowed young deaf children to view a story told in ASL, printed in English, and to answer questions, write a story, or caption the story they had seen. Videodisc technology's strength lies in the ability to conjoin multiple methods of communicating for children to link and learn their language to other languages.

Videotapes of books have also been used with children and adults with severe physical impairments which hinder their ability to independently turn pages. Close ups of pages and persons reading text while pointing to words can be shown for children to watch as a leisure activity. Pages can also be "freeze-framed" for independent reading or looking at pictures by adapting a remote control for a VCR. The user can activate the pause control via an adaptive switch to hold a page for as long as he or she wishes to look at it. A four-head VCR should be used with this approach for clear, non-jittery frames (Johnson & Pierce, 1993).

This approach to providing access to books and periodicals has its major components in items which often already exist in the household including a standard four-head VCR and video camera. The only adaptations required involve removing the cover from the remote control and connecting two wires to the "freeze" (still) function switch. These wires are then connected to a jack capable of connection with the individual's

adaptive switch. This minor modification does not interfere with the normal operation of the VCR by other users and can be performed by anyone capable of using a soldering iron.

The focus of this approach is to record books and magazines on videotape for later utilization by persons with physical impairments through activation of an adapted switch connected to the "still" function. When the switch is activated, the VCR "freezes," thus providing access to the page of the book displayed at that point in time.

The actual recording of the books is simple and not time-consuming. Users of this approach are cautioned to record materials purchased solely for a specific individual. Use of the video with multiple users might be considered a violation of copyright law. Users are advised to contact the publishers of the text they wish to adapt to obtain permission. It is doubtful that requests would be denied when publishers are advised of your purpose.

To record, simply position the book on a flat surface. Place the camera on a tripod and adjust the camera angle and zoom to enlarge the page as much as necessary. The size of the print and page is limited only by the size of the television screen for tape replay and by the limitations of the camera used in videotaping. After activating the record function, "thumb through" the text while maintaining the image in the camera view finder. A slight pause before turning the page is required to allow the eventual user time to activate the "freeze" switch during playback. Experimentation with the rate of page turning during the recording process may be necessary for use with individuals who are not adept at using their adaptive switch.

Variations of this approach are available for special purposes and for use with special populations. As previously mentioned, the text on each page of a book or periodical can be dramatically enlarged using the zoom feature of the camera during recording for persons with visual impairments. Direct audio coupling of the VCR is an option for hearing-impaired users with FM systems and compatible hearing aids. Individuals who have limited functional motoric ability for activating switches would benefit by using this approach without the "freeze" adaptation. In this particular

application, one simply records the book and allows enough time between pages to provide the user adequate access to each page.

With this method, the preparer has the option of reading the book and recording voice on the videotape for playback if desired. The capability of providing simultaneous audio feedback with the visual images of text and pictures is an ideal literacy teaching tool. Individual words or phrases can be highlighted for viewers with a flashlight while a speaker reads the text. This option combines access to print, pictures, and reading of the text for excellent support in developing a beginning reader's skills.

Computers and Software. Computers have been used to enhance development and function in preschool children with disabilities possibly longer than with typically developing children. Spiegel-McGill, Zippiroli, & Mistrett (1989) found that computers can help develop social skills in preschool children with social deficits and speech-language impairments. The computer games used in this study served as a point for joint attention and facilitated social interaction between children with and without disabilities. Spiegel et. al. felt that children with communication and social delays may need the structure and support offered by a computer and software to initiate and maintain social interactions. The Illinois Head Start Project adapted the Macomb Project computer curriculum which had been written for children with disabilities feeling that a computer can "equalize play and provide a voice for communication" for children with different language and physical abilities (Hutinger, Robinson, & Johanson, 1990, p. 33). Children with severe hearing impairments were given literacy instruction using a computer and a word processing program similar to the one described by Cohen (1993). The program used in this study also visualized the American Sign for the word and picture chosen by the child. After only six weeks of this instruction, the children showed significant gains in word recognition and identification, and realized they could communicate by writing as well as by signing (Prinz, Nelson, & Stedt, 1982). Meyers (1984) also demonstrated significant gains in written language abilities in non-speaking preschoolers via word processing and

other types of computer use. Steelman, Pierce, Alger, et. al. (1993) found emergent literacy development in preschool children with severe, multiple impairments. One aspects of their intervention program was daily use of the computer to read, write, and speak.

A rich history of success exists in using computers with children with learning disabilities. Many of these children have been shown to write more eagerly and continuously with word processors rather than paper and pencil (MacArthur & Shneiderman, 1986). All children, especially those with learning difficulties, tend to produce more literacy and mathematical work with computers but they need a substantial amount of teacher scaffolding and mediation to be as successful as possible (Cochran-Smith, Kahn, & Paris, 1988)..

Any child can use a computer given the vast array of adaptive access devices and the software choices currently available. Children may use computers with adaptive switch via a selection technique called scanning where the keyboard or other control buttons move across the screen until selected by the child by hitting his switch. Children with more motor control of any body part or who use a head stick or other adaptive pointing device may directly select desired keys or other functions on overly large or small keyboards (e.g., Unicorn Boards, Intellikeys, Power Pads). Software selection should follow the same suggestions give for all young children. Several special education software companies do produce programs especially tailored to meet goals such as vocabulary development, and appropriate syntax use. These programs may be used for independent practice but children with disabilities should also have access to exploratory and tool software so that they may also develop problem solving, artistic, and communication skills. Software that talks, e.g., Write Out-Loud, Kid Works 2 is especially beneficial for children with disabilities because speech output improves understanding, literacy abilities, and can be used as a communication system for children with severe speech impairments.

Other Assistive Technology Options

Many of the examples of using technology and assistive adaptations of equipment described above have been for the purpose of enhancing cognitive abilities and for some independent access to leisure activities. Children with disabilities have a range of special needs which necessitate the use of assistive technologies to aid in development, use, and independence in other areas. Descriptions of some of the current assistive technology options in the areas of mobility, self-care/environmental control and communication and suggestions for integration into preschool classrooms and curricula follows. See Buysse (this volume) for a description of toy adaptation for facilitating play in young children with disabilities. There are myriad devices that assist even the youngest child with mobility, self-care, environmental control, and communication. Readers are referred to Lewis (1993), Male (1994), and the list of resources found in the appendix for excellent reviews of current assistive technology to meet these needs.

Recommendations: Technology Development and Use with Young Children

Technology becomes outdated about as soon as it is available to the public. Something newer and better is always on the horizon. This chapter, therefore, has not focused on suggesting current educational television or video programming, software, or hardware but ways to use technology which may remain constant but hopefully improved as knowledge progresses. Newer technologies have not and still do not mean improved teaching or learning. Past, current, and future concerns and suggestions for technology use in preschool classrooms and for development of newer and better technology are summarized below.

Technology Transfer

Technology transfer refers to the development of new technology that speaks to the needs and interests of actual children, teachers, and families. The best or most appropriate technology has been developed in response to real consumer needs. Currently, technology development and use in the home often outpaces that at school (Betts, 1994). Teachers and parents must communicate with technology developers with their needs for future

technology development and with feedback on current technology that is being used at home and at school. The Communication Aids Manufacturers Association (CAMA) was initiated for this purpose. This group of developers from different companies are available for consumers to provide feedback regarding their communication systems. In this way, Stephen Hawking helped to develop his own voice output system which is now used by many non-speaking persons world-wide.

Technology Integration

When working with young children, teachers and other care givers should adhere to the caveats of Developmentally Appropriate Practice (DAP) (Bredekamp, 1992). Technology, television, videos, computers, and assistive devices can be one method of following or providing DAP. The essential characteristics of a curriculum or program which provides DAP include:

1. Activities which stimulate physical, emotional, social, and cognitive growth in an integrated fashion;

2. Activities are planned and implemented according to child's special interests and developmental progress;

3. Learning activities are active and interactive and support exploration;

4. Activities and materials are real and relevant to the lives of the children

As a tool, technology can be used by any child at any developmental level to accomplish real goals or just explore and enjoy. Television/video programming can be used to augment stories read in class. Children can also re-enact television and video programs, do thematically related activities related to what they have seen and heard, and tape and watch themselves using technology.

Learning to use the computer should only be a secondary objective (Muir, 1994). Learning to communicate, to draw, to color, to share and take turns-those preschool goals should be primary and one way of learning them is to use the computer. Computer based activities offer "more bang for the buck" because they can be done independently, freeing

up teacher time to play and talk with other children; computers present text, graphics and speech simultaneously which helps link these modes of communicating together for young children which is a necessary emergent literacy skill; computers offer a variety of modes of output to meet the needs of various learning styles; computers are motivating and fun for most children computers can be used by any child via adaptive access devices and are thus an equalizer. With a computer, Johnny with disabilities can draw, color, scribble, and talk just like the other children.

Example Goal	Example Software	Example Teacher Mediation
Jane will ask "Wh" questions.	MacGee	Teacher views program with Jane and plays a game asking "What do you see?"
Bobby uses N+V combinations imitate the	Playroom	Bobby clicks on random animals in the playroom. His therapist models N+ V combinations for him to about the actions on screen.

Technology can be appropriately integrated into a preschool classroom and help to provide DAP to a variety of learners in an engaging format. Technology can empower children to take a more active role in their learning (Betts, 1994);

Appropriate Choices

Before any type of new or existing technology (hardware, software, and programs) is purchased or used with young children, teachers, parents, and administrators should try it out themselves and evaluate it in the following areas:

• curricular match: Will using the technology support instructional concept, themes and philosophy of the educational curriculum, program, and/or the teacher?

• instructional design: Is the technology and it supports age appropriate? Are the objectives for its use clear?

• content: Is content thorough, current, and free of stereotyping, demeaning language or explicit, violent action or graphic?

• interest: Will the technology and its supporting materials and use be able to be used for real purposes and to promote problem solving skills? Will it engage students?

• technical quality: Does its features support its use and communicate its contents? (Bakker & Piper, 1994). A list of technology evaluation resources is included in the appendix. Additional suggestions are listed below.

Good Software for Young Children Should:

• Be open ended and encourages exploration and imagination. (A list of current software meeting suggested guidelines and a software evaluation protocol are included in the appendix);

• Be animated, interactive, & problem-solving oriented;

• Engender cooperation;

• Talk.

Good Television/video programming for Young Children Should

• Be structured and slow paced;

• Re-enact stories;

• Be non-violent;

Television, videos, and interactive videodiscs are, like other technologies, most appropriately used as an integral part of the existing curriculum. This media can be used for communication skills development as children write and present class and family news via television and video. It should also be used as a resource tailored to meet child interest and needs. Portions of videos and taped television programs should be shown to explain or emphasize concepts being worked on in class and/or to augment some area of child interest (Choat & Griffen, 1993).

Needed Areas of Development

As new technology continues to emerge, manufactures may wish to keep the following needs in mind, especially for children with disabilities and special needs and interests like children who are non-native language speakers:

• Wireless technology for infants and toddlers. Even very young children need access to adaptive toys for learning and enjoyment to be enhanced. For safety and normalization to occur, manufacturers should develop wireless access approaches for this very young population.

• Accessible word processing software. It is very difficult For children with severe physical impairments to color, draw, scribble, and write. Even with the adaptive access devices, this remains a very challenging process to the child and his caregivers. Manufactures of early word processing software would help this population to not become so delayed in their writing abilities if the software itself was more readily adaptable to children who have to rely on single switch access for activation.

• More and better educational videos, videodiscs, and television programs. Currently titles in these areas of electronic media are limited for very young children that have sound instructional design and educational value.

• Improved multimedia product development and use to meet the multiple learning styles that images, text, animation, and speech/sound effects offer a wider variety of children (Betts, 1994).

Adult Mediation and Scaffolding

One of the most beneficial ways to use existing electronic media is to ensure the human component- what teachers and parents say and do about and with technology and educational materials. Before, during, and after programming, talk with children, present alternative views and approaches than those offered in the program evaluative criticism, interpretation of content, rule making (Desmond, Hersch, Singer, & Singer, 1987). As previously mentioned, taped television programs shown on VCRs offer teachers and parents control to stop and start the program for discussion (Choat & Griffen, 1988).

With computer work, adults should teach a concept with manipulatives first, offer initial training and support, wait for child to ask for help, monitor to make sure child is not getting frustrated and that cooperation and sharing is occurring. Parents and teachers may

need to teach cooperation with very young children. Adults should always talk with children after they use computer to get feed back on task and social related issues.

Continuing Education and Support for Parents and Teachers

As previously stated, one of the major reasons technology has not been successfully integrated into the preschool curriculum is a lack of adequate teacher preparation. One-shot workshops are an ineffective approach (Hurst, 1994). "Training for technology simply can't be done on the fly or after hours (Driscoll, 1994, p. 82)." More effective inservice training provides modules from which adult learners may chose content that they need, follow-along technical support, and usually involves teachers and administrators in planning and implementation (Hurst, 1994). Model demonstration classrooms in which teachers learn to use technology in context with real children and for real purposes is also a superior approach to inservice training (Curtin, et.al., 1994). Time must be provided for teachers to use and experiment with technology and to learn, teach, and network with one another about how to integrate technology into their classrooms, their lives, and into their students lives (Driscoll, 1994).

Technologies old, current, and new will only be as effective as the people who use them and teach children to use them. Parents and teachers alike need to know about the dangers of allowing children to watch television unsupervised; provide alternative activities-videos, stress co-viewing, active watching (Clements & Nastasi, 1993). The keys to effective technology use with any young child are integrated and interactive.

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Assistive Technology Resources

Goosens', C., Crain, S., & Elder, P. (1992). Engineering the classroom environment for interactive symbolic communication: An emphasis on the developmental period, 18 months to five years. Southeast Augmentative Communication Conference, 2430 11th Ave. North, Birmingham, AL, 35234

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Burkhart, L. (1993). Total augmentative communication in the early childhood classroom. 6201 Candle Court, Eldersburg, MD, 21784.

Crestwood Company, 6625 N. Sidney Place, Milwaukee, Wisconsin, 53209-3259, (414) 354-5678. Nice catalogue of early communication aids.

Don Johnston, Inc., P.O. Box 639, 1000 N. Rand Rd. 115, Wauconda, IL, 60084-0639, (800) 999-4660. Many augmentative communication and computer resources.

Mayer-Johnson C., P.O. Box 1579, Solana Beach, CA, 92075-159, (619) 481-2489. This company offers Picture Communication Symbols and accessories.

Musselwhite, C. (1988). Communication programming for persons with severe handicaps. Austin, TX: Pro-Ed, 5431 Industrial Oaks Blvd., 78735

Emergent Literacy Resources

Adaptech, ISU Research, 2501 N. Loop Drive, Ames. IA, 50010. This company sells VoicePad Switches (tape switches) and the LinkSwitch which can be used to give voice output to books.

Ablenet, 1081 Tenth Ave. S.E., Minneapolis, MN 55414., (800)322-0956. This company sells digitized augmentative communication devices (The Speak Easy) which can be used with story reading and the slide projector switch adapter.

Big Book Maker software. Toucan, a division of Queue, Inc., 338 Commerce Drive, Fairfield, CT, 06430, (800)-232-2224.

Crestwood Co., 6625 N. Sidney Place, Milwaukee, Wisconsin, 53209-3259, (414) 352-5678. This company sells the talking card reader which can be used to give children a way to talk during story reading.

King-Debaun, P. (1990). Storytime: Stories, symbols, and emergent literacy activities for young children with special needs. Creative Communicating, P.O. Box 3358, Park City, Utah, 84060.

Koppenhaver, D., Pierce-Coleman, P., Kalman, S., & Yoder, D. (1991). The implications of emergent literacy research for children with developmental disabilities. American Journal of Speech-Language Pathology, 1(1), 20-33.

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Radio Shacks, Inc. These electronic stores sell magnetic reed switches and loop tapes, both which are useful in making reading more interactive through voice output.

Strickland, D. & Morrow, L. (1989). Emerging literacy: Young children learn to read and write. Newark, DEL: International Reading Association.

Toys for Special Children, 385 Washburton Ave., Hastings-on-Hudson, NY 10706, (914) 478-0960. Sells adapted remote controls for TV's and VCR's.

Trelease, J. (1992). The read-aloud handbook. New York: Penguin Books. This is an excellent resource for children's books and suggestions for interactive reading.

The Wright Group, 10949 Technology Place, San Diego, CA, 92127. Excellent resource for emergent level books.

Software Resources

Broderbund
500 Redwood Blvd.
Novato, CA 94948-6121
(800) 521-6263
The Playroom (Macintosh, Apple II, MS-DOS)
Kid Pix (Macintosh, MS-DOS)
Just Grandma and Me (Macintosh, MS-DOS)
The Treehouse (Macintosh, MS-DOS)
The Manhole (Macintosh, MS-DOS)

Creative Communicating
P.O. Box 3358
Park City, UT 84060

(801) 645-7737 Phone & fax
PowerPad software for IIe, IIGS, IIe emulation on Mac
StoryTime Powerpad Series (10 stories)
StoryTime Just for Fun (5 additional stories)
Magic Hats
Hide & Seek with Fluffy
Five Little Frogs
Five Little Fish
Mystery Box Surprise
Mystery Holiday Box Surprise
Bus to School
StoryTime Tales (book)

Davidson and Associates, Inc.
P.O. Box 2961
Torrance, CA 90509
(800) 556-6141 Customer Support
(800) 545-7677 Sales
KidWorks 2 drawing (Macintosh, MS-DOS)

Discis Knowledge Research, Inc.
P.O. Box 66
Buffalo, NY 14223-0066
(416) 250-6537 phone
(416) 250-6540 fax
Applelink: DISCIS
Discis Books (Macintosh only)
titles:
The Tale of Peter Rabbit
The Tale of Benjamin Bunny
Thomas' Snowsuit
Moving Gives Me a Stomach Ache
The Paper Bag Princess
Mud Puddle
Cinderella

Don Johnston Developmental Equipment Company
1000 N. Rand Rd., Bldg 115
Wauconda, IL 60084
(800) 999-4660 or (708) 526-2682
StoryTime (Macintosh only)
CircleTime (Macintosh only)

Dunamis, Inc.
3620 Hwy. 317
Suwanee, GA 30174
(800) 828-2443
Power Pads and related software

Edmark
P.O. Box 3218
Redmond, WA 98073-3218
(800) 426-0856
TDD (206) 861-7679

Bailey's Bookhouse (Macintosh only)
KidDesk (Macintosh only)

KidTech (Macintosh only)
21274 Oak Knoll
Tehachapi, CA 93561
(805) 822-1663
Titles:
Make it Go (B&W) $20
My Action Book (B&W) $30
Old MacDonald's Farm (color) $50
Old MacDonald's Farm (B&W) $30
Five Little Ducks (color or B&W) $50 or $30

Lawrence Productions
1800 S. 35th St.
Galesburg, MI 49053
(800) 42104157
McGee (Macintosh, Apple IIGS, MS-DOS, Amiga)
McGee at the Fun Fair (Macintosh, Apple IIGS, MS-DOS)
Katie's Farm (Macintosh, Apple IIGS, MS-DOS)

Mayer Johnson Company
P.O. Box 1579
Solana Beach, CA 92075-1579
(619) 481-2489 phone
(619) 259-5726 fax
Speaking Dynamically™ (Macintosh only)
I Can Play, Too!™
Boardmaker™ (International)

Merit Software
13635 Gamma Road
Dallas, TX 75244
Electric Crayon Deluxe Series (Macintosh, Apple II, MS-DOS, Amiga, Commodore 64)

PLAYWARE, Play and Learning Software for Youth
P.O. Box 44076
Kennesaw, GA 30144
Single switch and Power Pad input software

R.J. Cooper & Associates
24843 Del Prado Suite 283
Dana Point, CA 92629
714-240-1912
Single switch programs good for young children

Tom Snyder Productions
90 Sherman St.
Cambridge, MA 02140
(800) 342-0236
Tom Snyder lapware (Macintosh, Apple II, MS-DOS)
Jack and the Beanstalk
Flodd, the Bad Guy

Tough Krudd

UCLA Microcomputer Team
1000 Veteran Avenue, Room 23-10
Los Angeles, CA 90024
(213) 825-4821
Single switch, Power Pad, and TouchWindow software

Books on Computers and Other Resources:

Burkhart, L. (1987). Using computers and speech synthesis to facilitate communication with young and/or severely handicapped children. 6201 Candle Court, Eldersburg, MD, 21784

Carolina Computer Access Center
Alliance for Technology Access
(Judy Timms)
1307 Solano Ave.
Albany, CA 94706
(415) 528-0747
This resource has published a guide for using computers with infants and toddlers.

California Technology Project
P.O. Box 3842
Seal Beach, CA 90740

California Index of Instructional Video
c/o the California Instructional Video Clearing House
(209) 525-4993

CAST, Inc. (Center for Applied Special Technology)
39 Cross St.
Peabody, MA 01960
(508) 531-8555

Closing the Gap
P.O. Box 68
Henderson, MN 56044
(612) 248-3294

Developmental Evaluations of Software for Young Children by Susan W. Haugland and Daniel D. Shade
Delmar Publishers, Inc.
2 Computer Dr. West
Box 15-015
Albany, NY 12212

Educational Resources
1550 Executive Drive
Elgin, Illinois 60123
(800) 624-2926
(708) 888-8499 fax
(708) 888-8689 fax

High/Scope Survey of Early Childhood Software, by Warren Buckleitner
High/Scope Educational Research Foundation
600 North River St.
Ypsilanti, MI 48198
(313)-485-2000

Lekotek
1955 Cliff Valley Way
Atlanta, Georgia 30329
(404) 633-3430

MacWarehouse
47 Water Street
Norwalk, CT. 06854
(800) 622-6222 phone
(203) 855-1386 fax

Salpeter, J. (1992). A Parent's Handbook: Kids & Computers. SAMS: A division of Prentice Hall Computer Publishing, Carmel: Indiana. ISBN: 0-672-30144-x

TAM (Technology and Media)
Council for Exceptional Children
1920 Association Dr.
Weston, VA 22091-1598
(703) 620-3660

Trace Research and Development Center
S-151 Waisman Center
1500 Highland Ave.
Madison, WI 53705
(608) 262-6966

Worldwide Disability Solutions Group
Apple Computer
Mail Stop 36SE
20525 Mariani Ave.
Cupertino, CA 95014
(408) 974-7019
TDD (408) 974-7911

Independent software reviews:

Apple Computer Resources in Special Education Rehabilitation
DLM/Teaching Resources, Inc.
Park Allen, TX 75002
(800) 527-4747

EPIE (Educational Products Information Exchange)
P.O. Box 869
Water Mill, NY 11976
(516) 283-4922

Technology for Language Learning Special Education Public Domain Project

Software List (Updated: May 31, 1994)

Program	Age Group	Publisher	Approximate Price	Compatibility
AFC AFC Access: Touchwindow AFC: Library Setups Touchwindow: Edmark Unicorn Board (expanded, model) Unicorn Engineering		DJDE (see above)	 152.00 105.00 335.00 315.00	
AFC		DJDE (see above)		
Bailey's Book House	Preschool	Edmark (see above)	64.95	Macintosh
Big Book Maker™	Preschool School-age	Pelican, a division of Queue, Inc. 768 Farmington Avenue Farmington CT 06032 800 232-2224	49.94 35.95	Apple IIGS Apple IIe
Circletime Tales	Preschool	Don Johnston Devlopmental Equipment, Inc 100 Rand Road Building 115 Wauconda, IL 60084 708-526-2682; 1-800-999-4660	95.00	Macintosh

Create with Garfield	Preschool	DLM One DLM Park Allen TX 45002 800 527-4747 215 248-6300	25.95?	Apple IIe Apple IIGS
Discus Book Series	Preschool School-age	Mac Warenouse	19.00 each 389.00 Ed Pak	CD ROM
Electric Crayon: Holidays and Seasons, Dinosaurs are Forever, Letters for You	Preschool	Merit Software/ Potarware 13635 Gamma Road DAllas TX 75244 800 238-4277 214 385-2353	9.95 20.95/11.95	Apple IIe Apple IIGS
Facemaker™ Golden Edition	Preschool	Pelican (see above)	39.95 25.95	Apple IIe Apple IIGS
First Letter Fun	Preschool	MECC 6160 Summit Drive N Minneapolis MN 55430 800 685-6322 612 569-1500	29.95?	Apple IIe Apple IIGS
Fun from A to Z	Preschool	MECC (see above)	32.95	Apple IIe Apple IIGS
I Can Play Too	Preschool	Mayer-Johnson PO Box 1579 Solana Beach CA 92075-1579 619 481-2489	89.00	Macintosh
Kid Cuts	all ages	Broderbund	29.95	Mac
Kid Desk	Preschool School-age	Edmark PO Bix 3218 Redmond WA 98073-3218	39.95 27.95	Macintosh IBM

Kid Pix	Preschool School-age	Broderbund (see above)	37.95 59.95	Macintosh IBM
Kid Pix Companion	Preschool School-age	Broderbund (see above)	26.96 39.93	Macintosh IBM
Kid Works 2	Preschool School-age	Davidson & Associates	89.95	Macintosh
Living Book Series: Arthur's Teachers Trouble Just Grandma and Me	Preschool School-age	Broderbund (see above)	63.95 49.95	CD ROM
McGee	Preschool	Broderbund(see above) Educational Resources 800-634-2926	25.95	Apple IIGS Apple IIe
McGee at the Fun Fair	Preschool	Broderbund Educational Resources	25.95	Apple IIGS Macintosh
McGee Visits Katie's Farm	Preschool	Broderbund(see above) Educational Resources	25.95	Apple IIGS Macintosh
Monsters and Make Believe™	Preschool School-age	Pelican, a division of Queue, Inc.	49.95 35.95	Apple IIGS Apple IIe
Muppet™ Slate	Preschool	Wings for Learning/ Sunburst 1600 Green Hills Road PO Box 660002 Scotts Valley CA 95067-0002 408-438-5502 800-628-8897	75.00	Apple IIe Apple IIGS
Muppet™ Word Book	Preschool	Wings for Learning (see above)	65.00	Apple IIe Apple IIGS

Once Upon A Time..Series Vol I,II,III	Preschool School-age	Compu-Teach™ PO Box 9515 New Haven CT 06534 800-44-TEACH 203-777-7738	49.95 VI 25.95 VII VIII 31.95	Apple IIGS Apple IIe
Paint with Words	Preschool	MECC (see above)	29.95	Apple IIe Apple IIGS
Pow! Zap! Kerplunk!	Preschool	Pelican (see above)	49.95 35.95	Apple IIGS Apple IIe
Print Shop Deluxe	all ages	Broderbund	49.00	Mac
Read Along Series	Preschool	Berta-Max, Inc. 2901 T Avenue Unit 2 Ana___tes WA 98221 206 293-1978	79.90	Apple IIe Apple IIGS
Reader Rabbit 2	preschool school age	The Learning Company	35.00	Mac
Reading Magic Library Flodd, the Bad Guy	Preschool School-age?	Tom Snyder (see above)	44.95 31.95	Apple IIe Apple IIGS
Reading Magic Library Jack and the Bean Stalk	Preschool School-age?	Tom Snyder Productions 90 Sherman Street Cambridge MA 02140 800-342-0236 617-876-4433	44.95 31.95	Apple IIe Apple IIGS
Robot Writer™	Preschool	Pelican (see above)	49.95 35.95	Apple IIGS Apple IIe
Speaking Dynamically	Preschool School-age	Mayer-Johnson Co. (see above)	299.00	Macintosh
Storytime Tales	Preschool	Don Johnston Development Equipment, Inc. (see above)	95.00	Macintosh

The Backyard	ages 3-6	Broderbund	30.00	Mac IBM/Tandy Windows
The Children's Writing & Publishing Center	Preschool School-age	The Learning Company 6493 Kaiser Drive Fremont CA 94555 800 852-2255 415 792-2101	56.95	Apple IIe Apple IIGS Macintosh?
The Manhole	all ages	Cyan, Inc. P.O. Box 28096 Spokane, WA 99228 509-468-0807	29.95	Mac
The Playroom™	Preschool	Broderbund Software PO Box 12947 San Rafael; CA 94913-2977 800-521-6263	49.95 33.95	Apple IIGS Apple IIe IBM
The Print Shop®	Preschool School-age	Broderbund	59.95	Macintosh Apple IIGS IBM
The Treehouse	Preschool	Broderbund	44.95	Macintosh IBM
The Whole Neighborhood™	Preschool	Pelican (see above)	49.95	Apple IIGS Apple IIe
Thinkin Things	preschool school age	Edmark	39.95	Mac IBM

Word Tales	age 4-7	Time Warner Interactive Group 2210 Olive Ave. Burbank, CA 9150 email: dukeofrom@aol.com. 800-593-6334	39.00	Mac MPC (IBM)
ZoomBooks Four Footed Friends	Ages 3 and up	T/Maker Company 1390 Villa Street Mountain View, CA 94041 tel: 415-962-0195 FAX: 415-962-0201	35.00	Mac Windows (IBM compatible)

Courseware Definition Form

Course Title:

Course Rationale:

Learner Description:

Anticipated Audience:

Approximate Age Range:

Approximate Grade/Reading Level:

Other significant learner characteristics:

Prerequisite skills for learners:

What the course prepares the learner to do:

Lesson Environment:

Describe setting(s) in which the course will be used:

Is supervision needed to start the course?

Is supervision needed to answer questions?

Would music/sound distract others?

Learner interaction required:

What instructional medium or system is recommended for the presentation?

Why?

Course Behavioral Objectives:

1. Upon completion of the individual units in the ---, students will demonstrate mastery of ---, based upon the observations of the teacher.

2.

3.

Steelman, J. D., Barton, D. (1989). Courseware definition form. Developed as technical consultants for instructional design of software.

General Course Presentation (Flow):

Approximate time involved in the course: hours

Approximate time involved in each unit: minutes

Approximate time involved in each lesson: minutes

Instructional Approaches:

Lesson Design (see attachments for a detailed descriptions)

Functional Designs

___ 1. Drill & Practice
___ 2. Tutorial
___ 3. Instructional Games
___ 4. Problem-Solving
___ 5. Simulations
___ 6. Combination of the above designs

Physical Designs

___ 1. Linear
___ 2. Spiral
___ 3. Branching
___ 4. Multitrack
___ 5. Regenerative
___ 6. Adaptive

Logical Designs

___ 1. Didactic
___ 2. Discovery
___ 3. EGRUL
___ 4. RULEG
___ 5. Fading (prompts)

Record Keeping:

Pretest: Correct/incorrect responses

Post test: Correct/incorrect responses, mastery/nonmastery, percentage of correct response (ratio of number of correct responses to number of attempts)

Units: Which units completed or partially completed

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Unit Development Form

Unit Title:

Scope of the Unit:

Unit Rationale:

Behavioral Objectives:

Criterion Frames (questions assessing attainment of behavioral objectives):